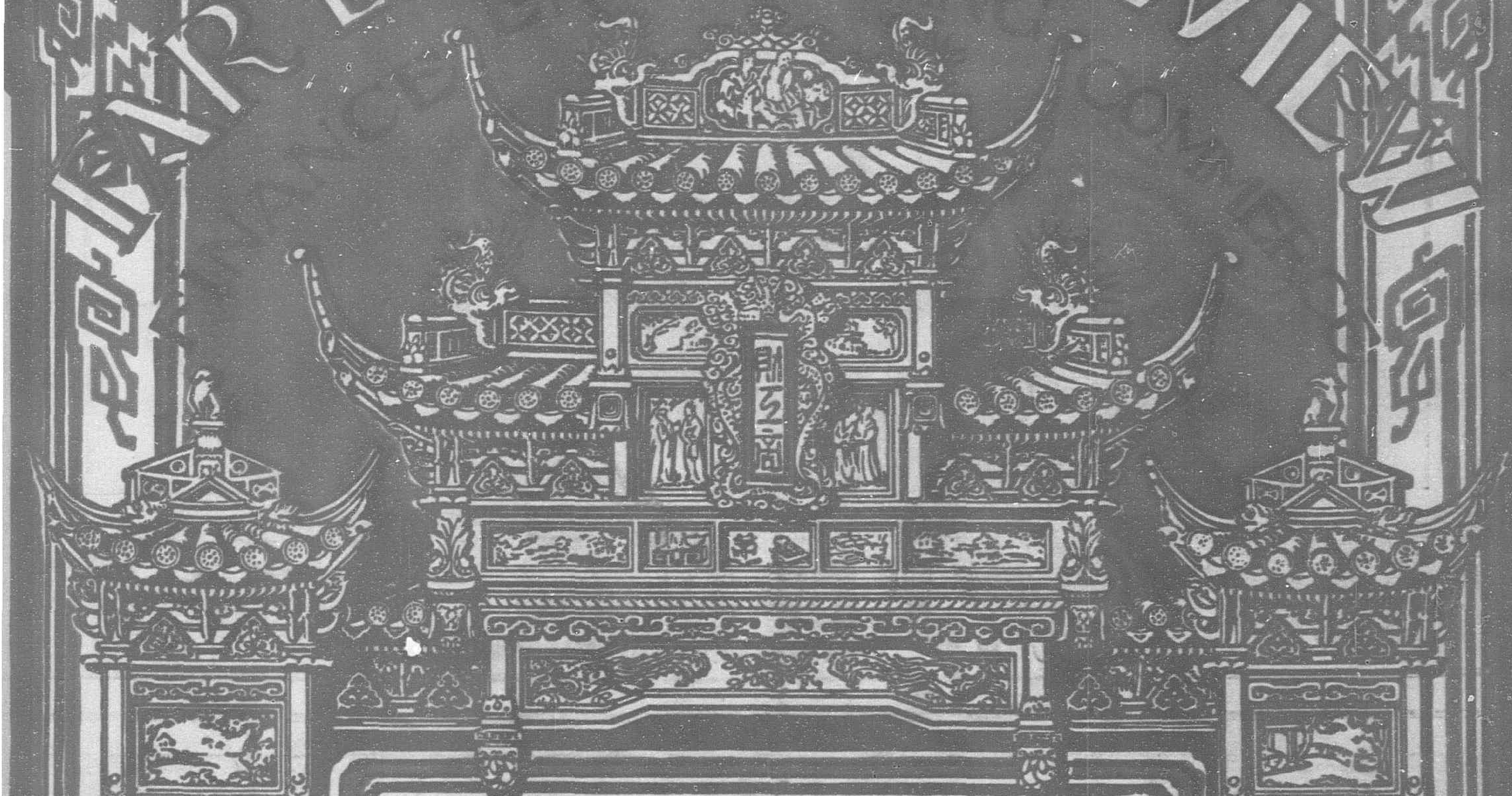
THE FAR EASTERN REVIEW

ENGINEERING FINANCE COMMERCE



上海仁記路拾六號

遠東時報

SUN YAT-SEN

First President of the Republic of China, Revolutionist and Patriot, the Leader of the Movement to Modernize an Ancient Nation

---

BACK TO PORTSMOUTH

THE RECRUDESCENCE OF JINGOISM

CHINA PROTESTS IN VAIN

DEVELOPMENTS IN THE FAR EASTERN IRON AND STEEL INDUSTRY

CHINA'S RAILWAYS

DESCRIPTION OF A SHALE OIL DISTILLATION PLANT

EARTHQUAKE DAMAGES TO THE TELEGRAPH AND TELEPHONES

PULVERIZED COAL PLANTS

CENTRAL WORKSHOPS OF THE F.M.S.

Vol. XXI
March, 1925
No. 3

E UNIVE
R 28 1
IBRAR

2
.21 3

Brownings do each job better and last longer

Brownings are designed and built to meet the requirements of the various industries, and whether the work requires a Bucket, Hook-block, Magnet, Wood Grapple, Dragline, Pile Driver, Steam Shovel or switch engine a Browning will do it with the highest efficiency over the longest period of time.

Brownings invaribly outwork other cranes, and continue to build profits long after others have been scrapped

Our engineers will be glad to show you Browning economies. Write for complete details and illustrated catalogue.

THE BROWNING COMPANY

16226 Waterloo Road
CLEVELAND, OHIO, U.S.A.
Cable Address: "Browning"

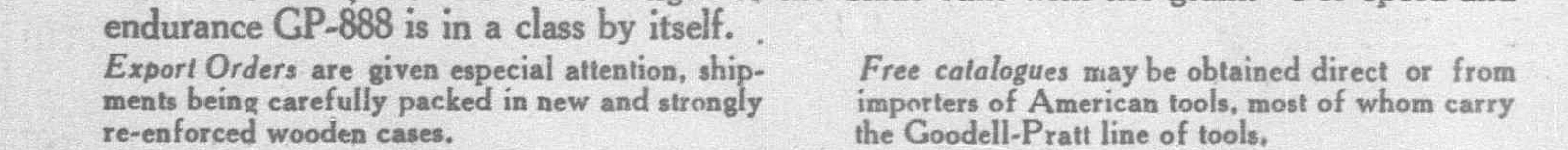
BROWNING LOCOMOTIVE CRANES

GOODELL-PRATT

1500 GOOD TOOLS

GP 888

This mark identifies the Goodell-Pratt *all hard* Hack Saw Blades.



DEPENDABLE HACK-SAW BLADES

Goodell-Pratt offers a variety of dependable Hack-Saw Blades, the two most popular styles being illustrated here.

GP-777 is a flexible blade with a soft center, and hardened back and teeth. Desirable for work which subjects the blade to severe twists and side strains.

GP-888 is an all hard blade, made from a special high grade of hot-rolled sheet steel, .025 inch thick, cut so that the length of the blade runs with the grain. For speed and endurance GP-888 is in a class by itself.

Export Orders are given especial attention, shipments being carefully packed in new and strongly re-enforced wooden cases.

Free catalogues may be obtained direct or from importers of American tools, most of whom carry the Goodell-Pratt line of tools.

Representatives:

Muller, Phipps & Sellers, Ltd.
Room No. 758 Marunouchi Building
Tokyo
(Central P. O. Box No. 98)

Muller & Phipps (China), Ltd.
N.K.K Building
2 Canton Road, Shanghai, China

Muller, Phipps & Sellers, Ltd.
Dojima Building
Osaka
(Central P. O, Box 63)

GOODELL-PRATT COMPANY, TOOLSMITHS, GREENFIELD, MASS., U.S.A.

GP 777

Goodell-Pratt *flexible* Hack-Saw Blades carry this mark

Dr. SUN YAT-SEN

(THE FAR EASTERN REVIEW)

The Far Eastern Review

ENGINEERING FINANCE COMMERCE

VOL. XXI SHANGHAI, MARCH, 1925 No. 3

SUN YAT-SEN

First President of the Republic of China, Revolutionist and Patriot, the Leader of the Movement to Modernize an Ancient Nation

THE death of Sun Yat-sen takes from China a personality whose presence has made itself pre-eminent in China's affairs during the past thirty years and who since the founding of the republic, has been the outstanding figure in the struggle to keep the country a republic and a democracy. Fighting against terrible odds, forced to spend the greater part of his life in exile or on the battle front, misunderstood by Chinese and foreigners alike, prevented by all the forces of selfishness from carrying his program for the regeneration of the country into effect, Dr. Sun continued to his dying day his struggle for his country's regeneration. For it must be borne in mind that notwithstanding the fact that circumstances forced Dr. Sun to be the destructive force of republican China, the puller down of worn out and useless institutions, in his own mind, in his serious writings, in his conversations, he had a clear constructive program for the reorganization of the government, for the modernization of the social and economic life, for the vitalizing of the means of comunications of the land.

The personality of Dr. Sun was startlingly magnetic. Although physically a small, thin man, he impressed his visitor as a person of inherent force. Like Roosevelt, he won confidence by personal magnetism, by sincerity of purpose, by the certainty of his own convictions. Himself the product of western influences, he found the inspiration for his ideas in the west, particularly in the democracies of Great Britain and the United States. Japan gave him refuge when the Manchus were seeking his head and it was in Japan in 1904 that he finally formulated his plans for the overthrow of the Manchus and organized the political party of the revolution, the *Tung Men Hui*. Dr. Sun was never anti-foreign in the sense that he took a violent dislike to one nation or another; he was rather pro-Chinese, seeking support for his own country and his own people wherever such support offered itself and resenting injustice at the hands of foreign powers. Thus, in his plans for the reorganization of China's railroads and the building of a huge railroad system which would bring the whole country together, thus strengthen the government, developing trade and bringing the force of the printed word to all the people of the land, he was not so concerned as to where the finances came from as that the contracts written should not be harmful to China. He was a man of vision rather than a visionary. He saw ahead of his age and therefore found it difficult to convince men who live only for the day.

Sun Yat-Sen in 1912

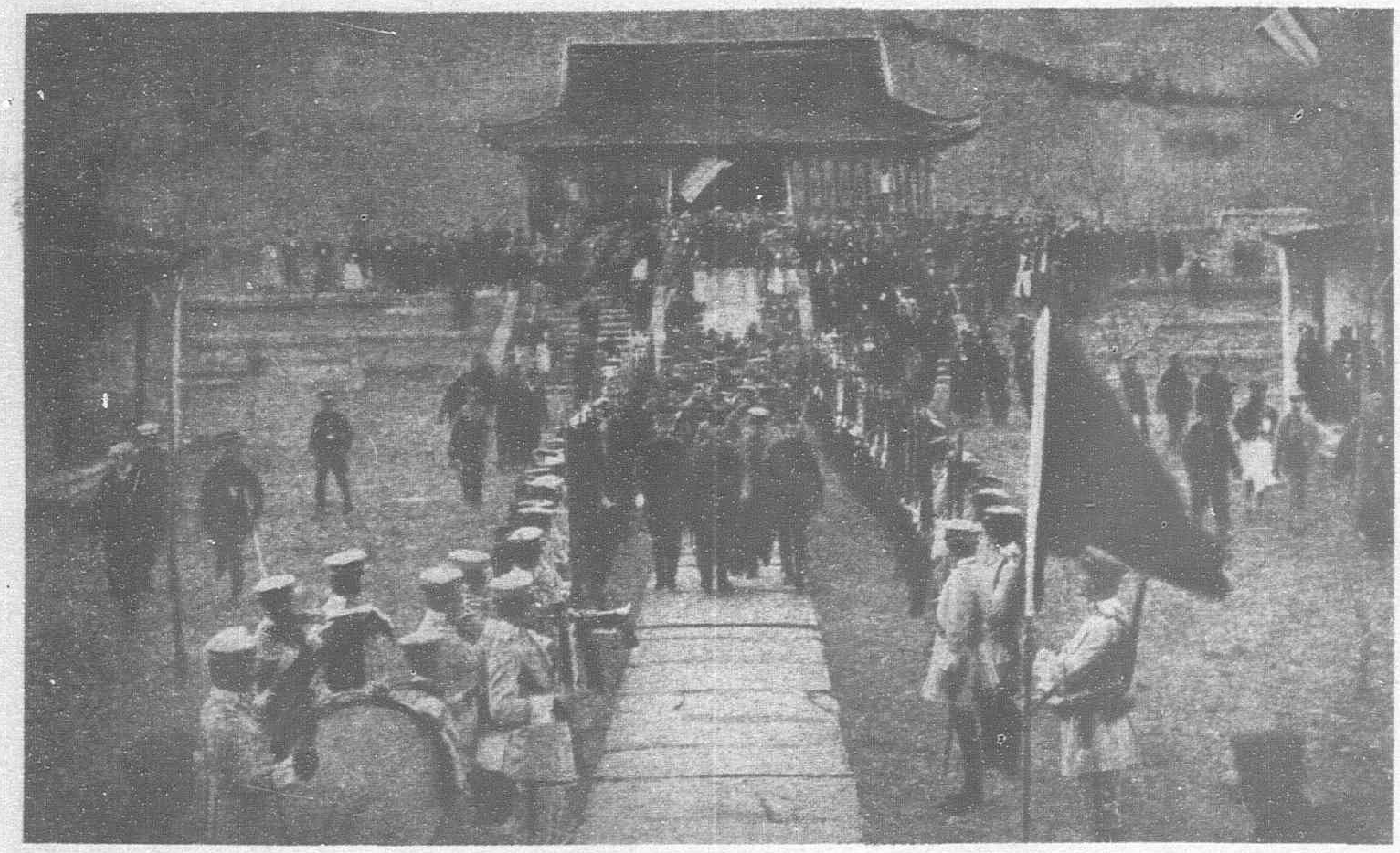
Sun Yat-sen was a native of Kuangtung province and was born the son of a farmer in the Heungshan district in 1866.

After learning English at a very early age he studied further under Dr. John Kerr, an American Presbyterian missionary, after whom hospitals and benevolent institutions in Kuangtung are named. Going later to Hongkong, Sun enrolled as a student of the Alice Memorial Hospital in 1887, from which institution he graduated five years later as a Licentiate of Medicine and Surgery, Hongkong, one of his teachers being Sir James Cantlie, M.D., LL.D. Doctor Sun, as he was thereafter known because of the title conferred upon him, became a Christian, and a member of the London Missionary Society.

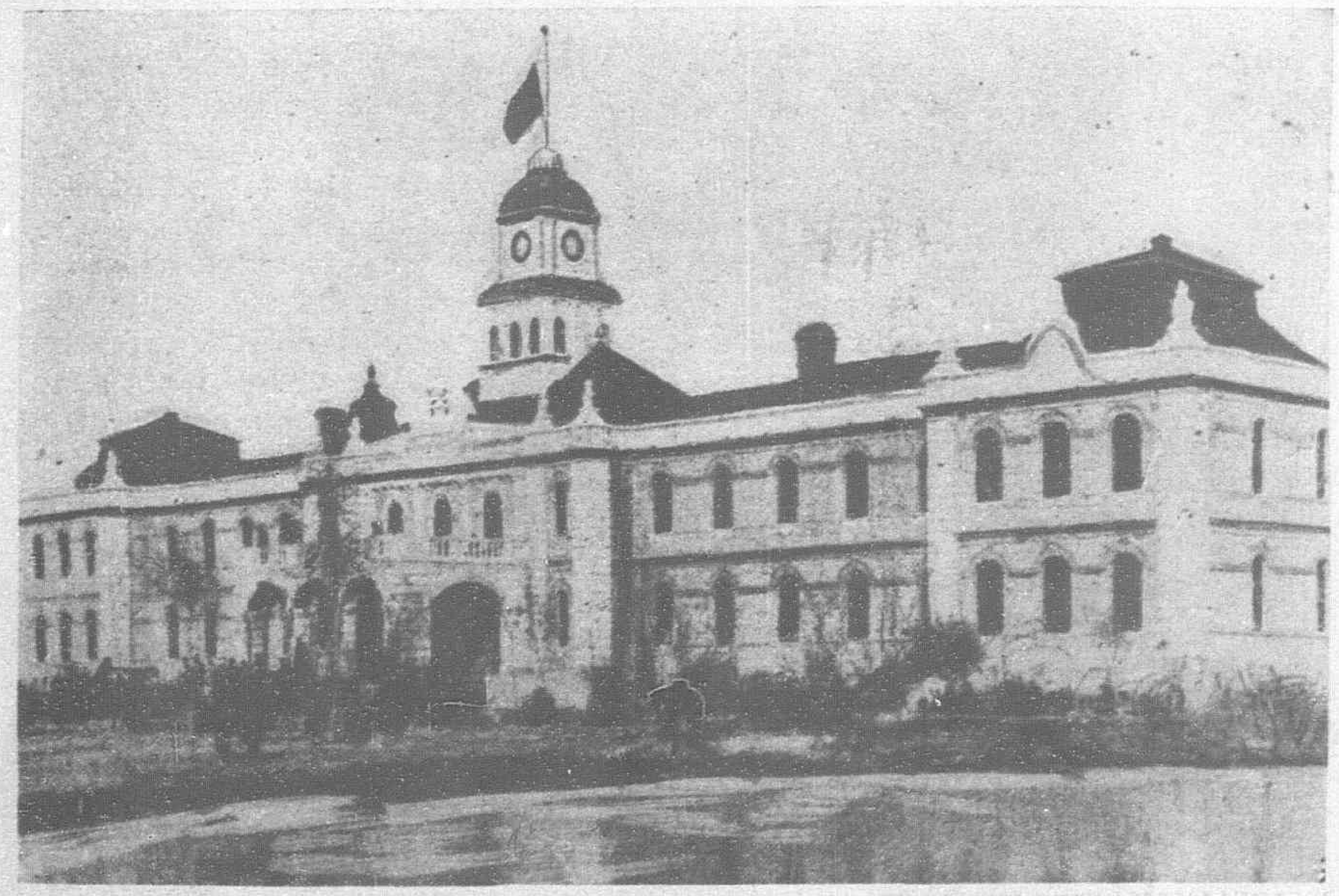
After his graduation, he settled to practise medicine in Macao and Canton. He made two trips to Tientsin at this time. His first trip was to be appointed to a medical position in the north bringing Tls. 100 a month. He failed to get the job, although he was highly recommended by influential Cantonese in Tientsin. On the second trip, he brought with him the resolutions of a progressive group of young men in Hongkong who sought to influence Viceroy Li Hung-chang to reform the government after China's failure in the Sino-Japanese war (1895). He never even saw Li Hung-chang. Thoroughly disgusted with Manchuism and officialdom, he now devoted himself to revolution.

After the failure of a conspiracy in Canton in 1895, Dr. Sun was forced to flee to Hongkong, Japan, Honolulu and America, spending short periods of time at each place. From America he went to England, arriving in 1896. On October 11, the same year, he was kidnapped outside the Chinese legation by the agents of the imperial government (who had offered a reward of half a million taels for Sun, dead or alive) and detained at the order of the Chinese minister. Sun managed to make his plight known to Dr. Cantlie, who was instrumental in effecting his release after a dezen days' imprisonment. After

THE FIRST NATIONAL ASSEMBLY AT NANKING



Dr. Sun Yat-sen and party proceeding through the Ming Mausoleum Grounds, Nanking, during the impressive ceremony of notifying the Mings that China had again returned to the Chinese



Capital of the Republican Provisional Government at Nanking (the Provincial Assembly Hall)

President Sun and his son, Sun Fo, in 1912 his release, Dr. Sun stayed for a short time in England, subsequently visiting Europe, America and the Far East as a revolutionary propagandist.

Going to Japan, Dr. Sun, in conjunction with Generals Huang Hsing, Hu Han-ming and Chen Chi-mei, and Messrs. Wang Ching-wei, Hsu Chien, C. T. Wang and others, established the *Tung Meng Hui*, a revolutionary organization for driving from China an alien dynasty.

Dr. Sun was abroad when the revolution started at Wuchang. He immediately returned to China and established the provisional government at Nanking.

To Dr. Sun the honor belongs of being China's first president, to which post he was elected at the end of 1911 and which he assumed on January 1, 1912. Immediately upon his assumption of the provisional presidency Dr. Sun visited the famous Ming Tombs at Nanking and there solemnly announced to the spirits of his ancestors that the Manchus and their despotism had been driven out and that China was under Chinese rule—this time as a republic.

As a result of a condition that the Manchus would abdicate if Yuan Shih-kai were given the presidency, Dr. Sun resigned and toured the various provinces, advocating a democratic policy for China. Yuan Shih-kai was elected president, and Li Yuan-hung became vice-president, an arrangement which was acceptable to Dr. Sun.

At the request of President Yuan, Dr. Sun visited Peking in August, 1912, and was given a royal reception. At this time he advocated an extensive railway construction program, which included lines which would cover the whole country and which would link China up with the Trans-Siberian railroad. He was appointed by Yuan Shih-kai, National Director of Railways.

Marshal Tuan Chi-Jui

After his return to Shanghai, Dr. Sun strongly advocated the transfer of the Chinese capital from Peking to Nanking or Wuchang. This aroused the ire of President Yuan, who alleged that Dr. Sun with plotting against him and using the money intended for the railway scheme, and the authority given him as director of the National Railway Corporation was cancelled. The 1913 revolution which followed was short-lived, and Dr. Sun was compelled to seek refuge in Japan. Yuan and his party then held the supremacy until 1915, when he attempted to proclaim himself emperor, on the ground that a republic was unsuitable for China. This movement failed and paved the way for Li Yuan-hung to become the president, but in the following year, forced by Gen. Chang Hsun's monarchical army, he dissolved parliament. Dr. Sun again opposed him and the Anfu party which had by this time come into power under the leadership of Marshal Tuan Chi-jui..

Attempts to bring about internal peace failed, and Dr. Sun went to Canton where with Dr. Wu Ting-fang (who had refused to countersign President Li's mandate dissolving parliament) Mr. Tong Shao-yi (the former premier), Gen. Chen Chuan-hsuan (the tiger mandarin, who was formerly viceroy of the two Kuang provinces), Gen. Chen Chiung-ming, Gen. Tang Chi-yao (*tuchun* of Yunnan) and others, he established a constitutional government under an administrative council. As a result of the machinations of the Kuangsi party, Dr. Sun and his followers were ejected in 1920, leaving Gen. Chen and others supreme. In the following year, after Gen. Chen Chiung-ming had forced the Kuangsi party out of Kuangtung, Dr. Sun again returned to Canton, being elected President by the small remnant of Parliament in April that year.

A year later, he was forced to flee from Canton, amidst a shower of bullets from Gen. Chen Chiung-ming's men. Two attempts had been made in the meantime to carry out northern punitive expeditions, both of which failed, one from Kuangsi and the other from northern Kuangtung.

Again expelled, he came to Shanghai, and here remained for a year, returning to Canton on February 15, two years ago after Gen. Chen Chiung-ming had been compelled to leave Canton by Yunnanese, Kuangsi, Hunanese and Kuangtung troops, whom Dr. Sun claimed to be his supporters. However, the Kuangsi troops turned traitors and attempted to force him once more to flee, but this *coup* failed and the Yunnanese troops won the field for Dr. Sun.

On October 10, 1924, trouble arose between Dr. Sun's government in Canton and the merchants' volunteers of that city through a consignment of arms and ammunition intended for the latter, which Dr. Sun seized. A fight occurred which resulted in the routing of the volunteers and the burning of a section of Canton city. This, together with the fact that he had brought "visiting" troops to Canton, and imposed crushing taxation resulted in a situation which made it advisable for Dr. Sun to leave Canton. Events in the north opened such an opportunity to him.

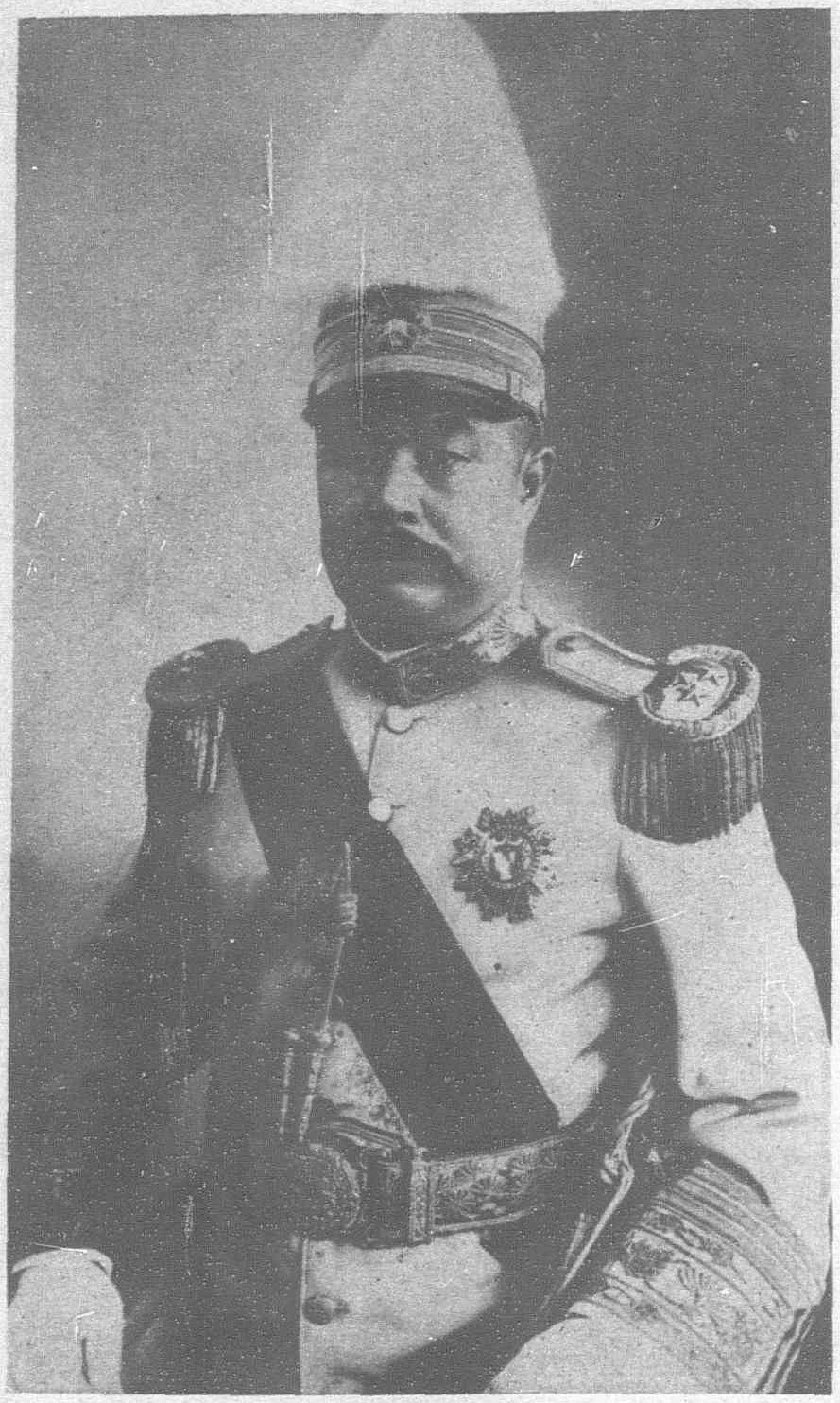
Dr. Sun left Canton on November 14, after hearing of the General Feng Yu-hsiang *coup* in Peking and in response to a request from Marshal Tuan. He arrived in Shanghai, where he delivered a strong pronouncement against foreigners. From here he went to Kobe, leaving again on November 30 for Tientsin. When he reached that port he was ill and had to go to Peking for treatment. He went to the Hotel de Pekin, remaining there some days before he was admitted to the Peking Union Medical College Hospital.

Dr. Sun's more mature ideas are undoubtedly best stated in his books, among which "Industrial Plans," "Elementary Treatise on People's Rights," "Sun Wen Hseuh Hsoh" ("Principles of Sun Yat-sen") and the "International Development of China," are the most important.

Dr. Sun leaves a wife, a son, Mr. Sun Fo, formerly mayor of Canton, and a daughter, Mrs. Tai En-tsai, the wife of the former mayor of Wuchow, a city on the borders of Kuangtung and Kuangsi.

Dr. Sun's part in the making of the Chinese republic cannot be limited to the mere outline in a biographical article. He conceived the idea of overthrowing the Manchus after a visit to Tientsin where he waited almost half a year to see Li Hung-chang, then Viceroy of Chihli, to whom he desired to present a memorial composed by a society of young men in Hongkong who were impressed with the seriousness of their country's condition after China's failure in the Sino-Japanese war. Li Hung-chang refused to see Dr. Sun, whose visit to the north opened his eyes to the futility of the Manchu officials and the Chinese servants of the Manchu Court. He gave up his medical practice in Macao and Canton and thenceforth devoted himself to revolutionary activities. He visited Japan, the Straits, Annam, the United States, Great Britain, everywhere stirring up his fellow-countrymen to a realization of the situation. When the revolution finally came, Sun Yat-sen had organized a great power among the over-seas Chinese who supported the revolution, financed the republican movement, kept the *Kuomintang* alive and always made it impossible for his enemies and the enemies of his party to continue in power. This force was so great that no matter what was done by such leaders as Yuan Shih-kai to destroy Dr. Sun's influence, he always remained a power. Of him, it can be said that he welded all the Chinese people, whether within China or in other countries, into a nation with a national outlook, a national aspiration, a national hope.

His nationalism was paramount. He could not understand China in terms of a loosely connected conglomeration of different peoples. To him China was homogeneous and he demanded of all his followers, a faithfulness not to a city or province, but to China as a whole. If perhaps at times he sacrifices Kuangtung for what he felt was the good of the whole nation, he did so because he was a Cantonese and could more easily sacrifice what was dearest to him, what was his own. He died a poor man in spite of all his opportunities to enrich himself. He sacrificed others in his struggle for democracy, but he also sacrificed himself. The greatness of



President Li Yuan-Hung

Sun Yat-sen perhaps lay in his complete unselfishness, his complete ability to do any task, to fight any battle, without regard for himself.

The character of the man, his national sense, his impressive personality was perhaps nowhere better expressed than at the Ming tombs in Nanking in 1912 when he announced to the last Chinese dynasty, the Mings, that China was again returned to the Chinese. The following description which is taken from THE FAR EASTERN REVIEW of April 1912 is here given as a reminder of what was perhaps the greatest event in the life of this wonderful man. It was written by an eye-witness of the ceremony:

> The whole ceremony was strikingly picturesque and impressive. Early in the dull morning soldiers to the number of fifteen thousand marched out of the city, passed the decaying palaces of the Mings, whose time-worn walls now grim and desolate reverberated to the strains of martial music and the thunder of tramping feet, and went on between gigantic stone monoliths standing silent guard on the way to the tomb. Along the whole route soldiers were formed up with glistening bayonets to await the coming of the retired president. The rainbow flags of the republic flew on the hills and in the dales, bugles blared and bands played, and the pomp and circumstances were such as should have made the great stone elephants and the giant men stir with interest or compel the palace of Hung Wu, now buried by a hill of earth, to burst asunder its mammoth covering and open its subterraneon portals to the new time.
>
> To the ranging eye the scene from the tomb was magnificent. Over the battlefield of two months ago and stretching like a dragon over the hills and hollows to the huge embattled walls of Nanking the troops in multi-colored uniforms stood in splendid array whilst the light played strangely tremulous upon the heaving lines of bayonets. The passing of Dr. Sun and his staff through the city gate, which was shelled so heartily and effectively by the revolutionary gunners from Purple Mountain on December 1, was the sign for a great stir among the military, and a wealth of strange, weird music from the bands and bugles. On horseback, accompanied by General Hwang-hsin, and General Hsu, Sun Yat-sen rode on his strange mission. Young officers on either side, with Mauser pistols drawn, scrutinized the crowds behind the soldiery for an overt move. Had anyone been unfortunate to lift a hand in a sinister manner his life would not have been worth a moment's purchase. But there was no call for action. The ex-president, pale, and bearing himself with brave show, rode in through the portals of the tomb enclosure to the boom of cannon and the strains of music. The sun had by this time broken through the clouds, and the scene was never to be forgotten when the historic ground and surroundings and the peculiar nature of the ceremony is realized. None could view the activities of the modern dressed Chinese before the tomb of the ancient without being strangely affected. Where were the spirits of the dead? What could they think if they could see? A dozen such questions were asked by a dozen different provincials. Dismounting near the first temple the president wandered round inspecting the ancient scrolls and inscriptions on massive tablets. The great tablets of the huge turtles' backs attracted his close attention. He spent minutes deciphering the engraving that time had almost obliterated. In each temple were altars spread with luxuries for the spirits; tea and sweetmeats, luscious pork and other substantial fare that the unbeliever cannot associate with a spiritland menu. Dr. Sun noted it all, and then went through the gates leading to the tunnel through which the coffin had to be borne hundreds of years ago in order that the spirits could find peace and rest. To form the tunnel a huge brick pile had been built and on top of this had been erected a temple for worship by royalty. It was now roofless, and rank weeds overgrew the floor. The red walls were falling, and decay had set its hand irrevocably to work. At the end furthest from the entrance where the old altar stood was now placed a table, above it flags of the republic were crossed, and between these was suspended an ancient and valuable life-sized painting of the emperor, Hung Wu. On the table a sumptuous array of food, tasty and satiating, was spread for the spirits, and two huge red candles blazed in the daylight and poured streams of red wax to the boards as they guttered in the breeze. The wind soughed in the trees covering the hill forming the grave mound of the emperor, and high above the white fog shrouded the top of Purple Mountain; there was not a sound but that of the moaning wind, as the president and his party stood with bare heads and profoundly bowed before the altar and the picture of the long-dead monarch. Three times they bent their heads, and whilst the master of ceremonies, in frock coat, read out to the spirits the reason for the gathering, the spectators could not but marvel at the significance of the ceremony and the strangeness of the group, dressed as they were in European military uniform, paying this homage to the spirits of an emperor who was laid to rest some five hundred years ago.
>
> Nor could Dr. Sung Yat-sen, the central figure, fail to impress. Pale and filled with emotion, he now faced the gathering to tell them briefly of the revolution and to announce, without attaching any significance to his self-effacing act, that he had resigned the presidency and that Yuan Shih-kai would be elected in his stead on his recommendation. Standing before the world, with his feet within the mausoleum of the first of an illustrious line of Chinese emperors, with his hands voluntarily releasing the topmost rung of the ladder of power in his land in order that his enemy, of greater experience, might guide the newfledged Republic of China, Sun Yat-sen was a veritable modern Cincinnatus, and perhaps he has more claim to admiration than the old Roman hero when it is remembered how he has been chased about

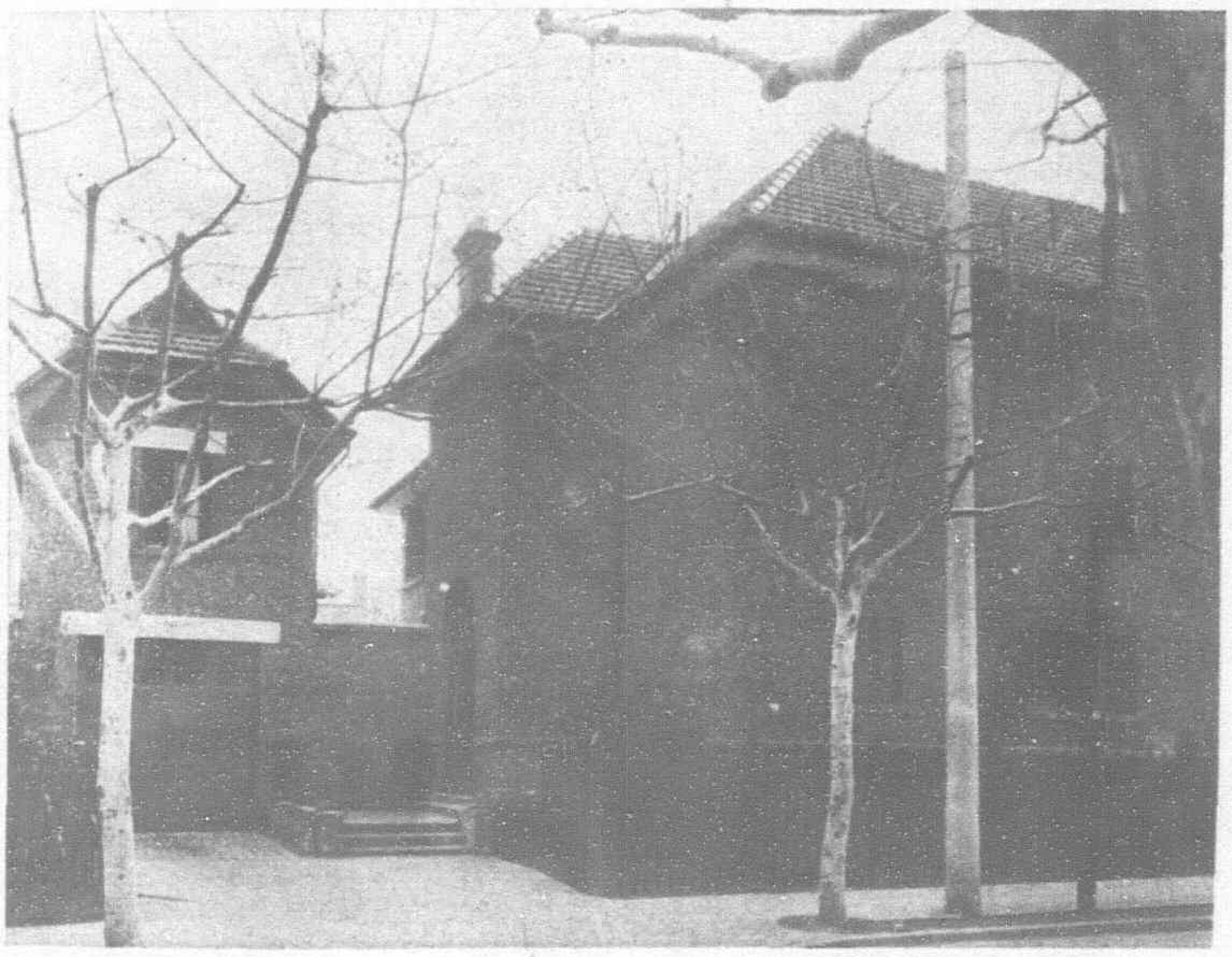
THE PEACE COMMISSIONERS, 1912
Premier Tang Shao-Yi, the Imperial Delegate, standing, and Dr. Wu Ting-Fang, Republican Delegate, seated

the world by a relentless foe, and how his return to his native land has been of less than two months' duration. Dr. Sun Yat-sen, as he delivered his inspiring address, was the personification of patriotism, and what he may lack in administrative experience, he more than makes up by the magnificent qualities that he possesses and which impelled him to sacrifice at his own volition such a high national position as he so quickly attained.

The men about him could not refrain from bursting into long and stirring cheers as he bespoke loyalty to Yuan Shih-kai, and pleaded for unity in the provinces and among the numerous branches of official life. And as the cheers rose in moving volume from the little crowd within the roofless temple near the tomb they were taken up by the concourse below and went sweeping away along the ranks of the soldiers, swelling as they swept up the hills, diminishing as they ran down the hollows, until the very walls of the city were reached, and there they mingled with the booming of the cannon saluting away along the Yangtze. It was a wonderful sight, and magnificent in effect. Bugles sent paeans across the recent battlefields, and amid the strains of band music Dr. Sun Yat-sen, self-stripped of presidential honours, left the spirits to marvel among themselves, and taking horse rode slowly back into the city through the long lines of still cheering troops.

The value of Dr. Sun to the Republic of China, his position in the history of the country and the effect of his death has nowhere been better described than by his associate and friend, Mr. Tong Shao-yi, first premier of the republic, in an interview for the *North-China Daily News*:

"The whole country will mourn Dr. Sun Yat-sen, whose life has been a courageous devotion to the ideal of democratic government in China. We were not only fellow-provincial but natives of the same district, our homes being but eight miles apart in Heungshan. For some 40 years we have known of one another and since the founding of the republic, we have often been associated in public service.



Chung Hua Studio

Dr. Sun Yat-Sen's Residence in Shanghai

To Dr. Sun will have to go the credit of having made the revolution an effective force and of having crystallized public opinion behind a democratic movement, which has survived all the mistakes and the reactions of the past 13 years. That democratic movement has in no respect diminished its force, although many citizens of the country have changed their minds about what sort of democracy China is to have. Dr. Sun Yat-sen, Dr. Wu Ting-fang and myself, at the start, formed a sort of group, which represented in the public mind, the leadership of Young China, because we adhered firmly to our faith in democracy. Dr Wu represented the revolutionists and I represented the government at the peace conference which ended the Manchu *regime*. But it must be remembered that before I left Peking, it was already known that I favored a democracy and perhaps that is why I was sent. It was to avoid unnecessary bloodshed and the continuance of a long, drawn-out strife. Dr. Sun was made President and I became Premier of the republic. Dr. Wu Ting-fang was the Minister of Foreign Affairs.

Democracy is in itself a very great ideal and its leader in China must remain in our history a notable figure. But there are many forms of democracy and we have experimented with some of them and have not been very successful. The experiments which fail bring a certain opprobrium upon those who try them, but such judgments are usually hasty and without serious importance. The fact that the failure of these experiments has in no way impaired the popular support of democracy proves conclusively that to the Chinese people the present period is recognized as an experimental stage in their development and that they realize that only through trial and error can they find a system of government which will be democratic in spirit and practice and at the same time, in full accord with their history and traditions.

"Dr. Sun realized this and sought in several ways to find a method which would work. That he did not always succeed was only natural, since no one man will succeed, can succeed, in solving this problem. But underlying all his experiments, as underlying all our ideals, is the sense, inherent in every Chinese, of local self-government. At times, this sense is dulled by the course of events, but at present it is particularly keen, particularly active. Throughout China, men are thinking of reconstructing not only their provincial governments, but even limiting their activities to their districts and villages. We have to begin our work of reconstruction with the smaller units, if ever we are to get anywhere.

"The Kuomintang party, of which Dr. Sun was the leader, will survive his death. It is the only political party in China which is organized and which contains the necessary leadership for united action. It is the only national political party. It is the only political group in the country which includes large numbers of men who will sacrifice themselves for their country, even as they have, in the past, sacrificed themselves. During the lifetime of Dr. Sun, the party naturally orientated itself about his personality and there were occasional internal dissensions, which is only natural and usual, in a large body of men. Now that he is gone, certain elements will drift away because their relationship to the party was largely a personal relationship with Dr. Sun and perhaps they will find it difficult to work with those who will come to the helm. But these are matters of detail. As long as the democratic ideal survives in China, the Kuomintang will survive as its historical guardian.

"Again, I must repeat that throughout the country that ideal is now expressing itself most effectively in a provincial autonomy movement, a political tendency in China which through its mechanism will end the sway of the militarist and of secret political activities, as with it, secrecy disappears. You cannot have a secret when 22 provincial assemblies have to know about it. Secret politics, secret financial operations, secret opium and arms operations, secret international relations, are the principal enemies of democracy in China. Dr. Sun disliked all this secrecy. He tried to play in the open and therefore often offended people he really liked. But he preferred to risk offending them rather than to tell them what was untrue. And how much better is that than the sort of thing his opponents, the various governments in Peking, have given us?

"You ask what will be the political effect of Dr. Sun's passing away. I reply: We shall mourn his loss. And in the moment of mourning we shall forget everything about him but one outstanding fact and that is that he was the champion of democracy in China. Everything else will be forgotten. Every personal whim, every personal dissension, every difference of opinion will be forgotten. Only the large fact of his life will remain, his struggle against despotism, his struggle against corruption, his struggle for the right of the governed to a say in the government. And throughout the country as this thought sweeps the minds of the people, as this thought becomes the cry of the suffering millions, as men speak it and write it and read it, a spirit will be abroad in the land which will make itself felt and which in the end will shake Peking to its very foundations. For Peking is built on the sands of a Mongolian desert.

Who can succeed to the position of Dr. Sun Yat-sen in China? How difficult it is to think of a leader who can merge in his own personality all the characteristics which made Dr. Sun what he was and which gave him so honored a place in Chinese history! The battle in China now is for unification, for the re-establishment of governmental authority, for the revision of China's international relations, for the development of trade and commerce and the vitalization of communications. Where is there a man who can bring the country out of chaos, who can lead China to a position where she will command the respect due her? Whoever that man is, he will have to be guided by the principles laid down by Dr. Sun, he will have to have the sterling qualities of Dr. Sun, he will have to live up to the tradition of honesty and sincerity established by Dr. Sun.

Together with the millions of China, we mourn the loss not so much of a great Chinese as a pre-eminent citizen of the world!

Back to Portsmouth

The United States Court for China Reverses Decision Which Prepared the Way for a Revision of the Treaties

JUDGE Milton D. Purdy of the United States Court for China on March 2, handed a decision in which he reversed the Commissioner of that court, who a year ago decided that the American government assumed extraterritorial jurisdiction over American citizens in Dairen in spite of the fact that the State Department had recognized Japanese jurisdiction in the Kwantung leased territory as it had recognized British jurisdiction in Hongkong. When Commissioner Lurton rendered his decision, a movement was afoot in China among a certain element of the Chinese to force Japan to forego her rights in Kwantung as she forewent them in Shantung. The decision synchronized with this anti-Japanese movement in China and gave to radical Chinese the impression that the American government was supporting every anti-Japanese movement in the country. The decision was particularly objectionable because a minor official of a court exercising consular jurisdiction took it upon himself to disregard the agreements, understanding, usages between the United States and Japan, upsetting in a single decision the work of the President of the United States and the Secretary of State in building a structure of friendship and amity between the United States and Japan.

At that time, THE FAR EASTERN REVIEW protested against this decision in an article entitled, "Back to Portsmouth." Almost alone in championing the cause of justice, this paper risked incurring the disfavor of the court, by criticizing a judicial decision. We felt that it was even a greater service to the United States than it was to Japan, to call attention to the fact that the court was misreading the treaties and the practice of the State Department and was establishing a dangerous precedent which was bound ultimately to lead to very serious difficulties not only with Japan in Kwantung leased territory but with Great Britain in Hongkong. The decision was a direct attack on all leased territories, a questioning of the conduct of friendly nations. It was a judgement against these friendly nations rather than against the sea-captain directly involved in the proceedings.

The decision of Commissioner Lurton which has just been reversed by Judge Milton D. Purdy, read as follows:

"The defendant in this cause questions the jurisdiction of the United States Court for China to act on the ground that the crime herein charged was committed in the city of Dairen, which is situated in that portion of China known as the Liaotung peninsula and known as the leased territory, claiming it to be under the sovereign power of Japan.

"*In determining the questions herein involved, it is deemed necessary* to construe the various treaties entered into by the United States with China, as they are the governing law.

"In the year 1844, the United States entered into a treaty with China which gave to the former certain extraterritorial rights within the territory of the latter. In article No. 21 of said treaty, the United States was given jurisdiction to try and punish its citizens who were charged with the commission of a crime within the territorial limits of China,and it reads as follows:

'Subjects of China who may be guilty of any criminal acts towards any citizens of the United States, shall be arrested and punished by the Chinese authorities according to the laws of China, and citizens of the United States who may commit any crimes in China shall be subject to be tried and punished only by the consul or other public functionary of the United States. And *in further prevention of all controversy and disaffection, justice shall be* equally and impartially administered on both sides.'

"The same jurisdiction was also embodied in the treaty of 1858 in article No. 11 thereof.

"On March 27, 1898, the Russian government concluded a lease with China regarding the Liaotung peninsula. In article No. 1 of the terms of this lease, and in the last paragraph of said article, it reads as follows"

'This act of lease, however, in no way violates the sovereign rights of his majesty the Emperor of China to the above mentioned territory:'

The territory described in this lease included the city of Dalny which has since been renamed Dairen.

"In the treaty of peace between Russia and Japan, dated September 5, 1905, Russia transferred the lease she had made with China relative to the *Liaotung peninsula to Japan, but subject, however, to the consent of China* who ratified it on January 23, 1906, under a separate treaty with Japan.

An Analysis

"In analysing the intentions of the parties to these treaties, it appears that China in the original lease made with Russia reserved to herself her sovereign powers over this territory as it was explicitly so stated in the body of the lease. It further appears that in the treaty of peace between Russia and Japan, these same rights were transferred to the latter subject, however, to the acquiescence of China which appears to have been given a few months later. The period of this lease as acquired by Japan extended only until March 27, 1923. In the beginning of the year 1915, Japan sought to renew the Liaotung lease with China, and exchanged notes respecting same under the title of The Treaty Respecting South Manchuria and Eastern Inner Mongolia. This treaty among other things extended the term of the lease of Port Arthur and Dalny for a period of ninety-nine years. It also contained an article which can be said bears strongly on the question that is being considered here.

This article known as article No. 5 of said treaty in the second paragraph thereof, reads as follows:

'Civil and criminal cases in which the defendants are Japanese, shall be tried and adjudicated by the Japanese consul; those in which the defendants are Chinese, shall be tried and adjudicated by Chinese authorities. In either case, an officer may be deputed to the court to attend the proceeding; but amongst civil cases between Chinese and Japanese relating to land, shall be tried and adjudicated by delegates of both nations conjointly in accordance with Chinese laws and local usage.'

"In construing this particular part of the treaty, it shows conclusively that Japan recognized the sovereignty of China, and reiterated in specific terms her extraterritorial rights for her subjects and does not claim supreme powers to herself to the exclusion of Chinese sovereignty in this particular territory.

"During the negotiations between Japan and China respecting this treaty, the famous Twenty-One Demands presented to China by Japan came into existence, one of which, bore directly on the extension of the lease of Port Arthur and Dalny. On May 8, 1915, an ultimatum was handed to China by Japan requiring her to agree to these demands which the former claims was accepted under duress. However, before China's formal acceptance was given, the United States government communicated the reservation of rights of the American government under date of May 13, 1915, as follows:

'In view of the circumstances of the negotiations which have taken place, and which are now pending between the government of China and the government of Japan, and of the agreements which have been reached as a result thereof, the government of the United States has the honor to notify the *government of the Chinese republic that it cannot recognize any agreement* or undertaking which has been entered into or may be entered into between the governments of China and Japan impairing the treaty rights of the United States and its citizens in China; the political or territorial integrity of the republic of China or the international policy relative to China, commonly known as the 'open door' policy.'

"It is here very apparent that the United States has not been a party to or has in any way waived her extraterritorial rights given to her by the various treaties with China, and took the occasion to so notify both China and Japan before this treaty was actually signed.

At Washington

"The same question subsequently occupied a very important part in the sixth plenary session of the conference on the limitation of armaments held in Washington on February 4, 1922 (page 324).

"The chairman, the Honorable Charles Evans Hughes, secretary of *state of the United States, read into the record of that session the following* statements which were declared to be a part of the record, and agreed to by the representative of the powers present. It reads in part as follows:

'By the chairman:

'I am directed by the committee on Pacific and Far Eastern questions to read for the purpose of having the statements formally placed upon the records of the conference, the following declarations with respect to the so-called twenty-one demands of the Sino-Japanese treaties of 1915.

'The first statement that I shall read is the statement made to the committee by Baron Shidehara on behalf of the Japanese government. . . . .

'(2) Japan has no intention of insisting on her preferential rights in the Sino-Japanese arrangement in question concerning the engagement in China of Japanese advisors or instructors on political, financial, military or police matters in South Manchuria.'

"And in article No. 3 of the last text is found:

'In coming to this decision which I have had the honor to announce, Japan has been guided by a spirit of fairness and moderation, having always in view China's sovereign rights and the principle of equal opportunity.'

"The chairman, then on behalf of the government of the United States, read in part as follows:

'With respect to this grant, the government of the United States will, of course, regard it as not intended to be exclusive, and, as in the past, will claim from the Chinese government for American citizens, the benefits accruing to them by virtue of the most favored nation clause in the treaties between the United States and China.'

"In these utterances which have been made a permanent record, and adopted by the United States government, it shows conclusively that it never has relinquished its extraterritorial rights in this particular territory in question.

"*It further appears that Mr. Hay, Secretary of State in 1900, instructed* the consuls in China that they had no authority to exercise extraterritorial jurisdiction or to perform non-judicial consular acts within the leased territory under their present Chinese exequators, and that his instructions were complied with: that the reason for so acting was due to the fact that the other powers with the exception of Japan were under the opinion at that time that the leasing of Weihaiwei, Shantung and the Liaotung peninsula transferred the sovereignty to the lessees.

"In the memorandum of Mr. Van Dyne, assistant solicitor for the United States (For Rel. 1900, 387, 388, 389, Moore's International Law Digest) he seems to take a different view of this situation than did Mr. Hay, and says:

'As it is expressly stipulated in the lease that China retains sovereignty over the territory leased, it could doubtless be asserted that such territory is *still Chinese territory and that the provisions of our treaties with China* granting consular jurisdiction are still applicable therein. But in view of the express relinquishment of jurisdiction by China, I infer that the territory is permanently (?) is merely intended to cut off possible future claims of the lessees that the sovereignty of the territory is permanently vested in them. The intention and effects of these leases appear to me to have been the relinquishment by China, during the term of the leases, and the conferring upon the foreign power in each case of all jurisdiction over the territory. Such relinquishment would seem, also, to involve the loss by the United States of its right to exercise consular jurisdiction in the territories leased. And, as Mr. Conger suggests, as these territories have practically passed from the control of an uncivilized people to civilized, there would seem to be no substantial reason for continuing to exercise such jurisdiction.'

"*Furthermore, the United States was given certain rights within the* integral territory of China by a treaty, and these rights can be abrogated in no other way than that in which they were given. In other words, before the United States *relinquished extraterritoriality in any portion of China as* existed in 1844, there must be definite action taken by congress.

"Judge Moore in his International Law Digest (Vol. 5, page 321) says:

'That the contracting power can annul the treaty cannot, I presume, be questioned, the same authority precisely, being exercised in annulling as in making a treaty.'

"He further ennunciates a principle (Vol. 5, page 337) which strongly bears on this case, and which reads as follows:

'An alliance between two nations cannot absolve either of them from the obligations of previous treaties with third powers.'

"And again (Vol. 5, page 369):

'It is the duty of the courts not to construe an act of congress as modifying and annulling a treaty made with another nation, unless its words clearly and strongly point to such a construction.'
Citing in support of this, principly, the cases of Lem Moon Sing vs. U. S. 158 U. S. 538, and U. S. vs. Mrs. Gue Lin, 176 U. S. 459.

"This last principle of Judge Moore's seems to cover the situation herein involved. The defendant in this case is the one that is attacking the jurisdiction of the United States in exercising its authority over him in an action brought in its federal court. There is no positive assertion on the part of the United States that it has abrogated its treaties with China in respect to the issue involved in this case.

"It might be said that this situation would become more complex should this same objection be made by a friendly power, as the disposition of the matter would then be adjudicated by a totally different tribunal.

"Having taken into consideration the various phases of this novel case, I fail to find that the United States court for China has lost its jurisdiction over this defendant who is charged with committing a crime within the leased territory of China, and more particularly described as being in the city of Dairen. The defendant's demurrer is therefore, accordingly overruled, and as there appears to be sufficient evidence adduced to make out a *prima facie* case of assault against him, he is required to answer the information filed herein."

This decision is now declared null and void. Judge Purdy did not uphold it on a single point. He wiped it out out lock, stock and barrel.

It is interesting to note that when the first decision was rendered, certain Americans in China who delight in what appears to them the discomfiture of Japan, were overjoyed. They thought that here was an opportunity of undoing by a judicial decision, the excellent work of the State Department in lessening the diplomatic value of the jingoistic attacks on Japan both in the United States and among Americans in China. *The China Press*, commenting on our criticisms of Commissioner Lurton's decision, said:

"A monthly magazine has taken upon itself to criticise the decision, not because it may be legally wrong, but because it might lead to unfortunate developments in the diplomatic history of the Far East, involving the reopening of a large number of questions which had been regarded as effectively settled. *But we are of the opinion that the decision of the court deserves no such criticism, but rather praise as a ruling calculated to reaffirm the constitutional rights of American citizens as defined by treaties embodied in our law. The treaties of 1844 and 1858 having been ratified by congress became part of the law of the United States and no agreement between other countries can modify the privileges of our citizens without the consent of our legislature. It is consequently a matter of relatively small importance what interpretation the state department cares to put on the documents involved in this case.* Indeed, we have always understood that in various rulings secretaries of state have refused to pass on any question the answer to which might bring it into conflict with any tribunal, and the inference to be drawn from this is, that the state department itself desires the courts of the United States to be absolutely untrammeled by any political or diplomatic consideration.

"What the writer of the article in question apparently fails to perceive is that the duty of any court of justice is to administer the laws applicable within its jurisdiction and to suggest that such application should be subject to diplomatic expediency is to advance a proposition foreign to the spirit of any judicial process."

To this we replied:

Quite right. The legal aspects of the decision are beyond our criticism. Our comment takes the form that it is manifestly injurious to the prestige of the American government for an official of a bureau under the direction of the State Department to precipitate a delicate international issue without consulting beforehand with his superiors, especially when the decision reverses the established policy of the government, renders possible a readjustment of our foreign relations and says in effect, that the state department is incompetent to interpret the treaties. Rushing through such a decision and giving it out immediately for publication in the local press without reference to the position of the state department would seem to be the height of discourtesy, one that would not be tolerated in any other government or private business enterprise.

If it is a matter of relatively small importance what interpretation the State Department cares to put on the documents involved in the Lurton decision, then its stand on other equally delicate international questions is also a matter of relatively small importance and opens the way for further impairments of its constitutional powers by other federal departments operating in China under treaty provisions which, in the last analysis, the state department is called upon to interpret and enforce. A bill is now before congress to have the U.. S. Court for China transferred from the jurisdiction of the state department to the department of justice. The bill has received the endorsement of the Associated American Chambers of Commerce of China. The "American" newspapers reflecting the policies of this organization are very strong in support of the measure. Any scheme which undermines the authority of the state department by the independent operation of other American governmental departments in China tends to strengthen the authority of the invisible government in this country, and would naturally receive the approval of the editorial writer for *The China Press*.

Now, there would seem to have been no urgent judicial issue involved in raising the question of the court's jurisdiction over American citizens in the Kwantung leased territory, for, after rendering the decision, the accused was permitted to depart from the jurisdiction of the court without hindrance. It would seem that after setting aside the established policy of the government and precipitating the issue with Japan, the court should have as energetically enforced its decision and remanded the accused for trial. As it stands, an international issue has been created without in any way advancing the ends of justice. When viewed from this angle, the decision can properly be interpreted as a wholly gratuitous slap at the state department—part of the campaign to have the court freed from its supervision.

The question of lessening the authority over American institutions in China has apparently ceased to agitate the American community in China. Since Judge Purdy became the presiding officer of the United States Court for China, all talk of transferring the court from the jurisdiction of the Department of State to the Department of Justice has ceased. There is no longer any agitation with regard to the court. It has become what it always should have been, a judicial agency for protection of the life and property of Americans in China in accordance with the treaties between the United States and China at the same time respecting the rights of other nationals in China and the arrangements made between the United States and other nations concerning China and Americans in China. That is the business of the court. All else is extraneous.

The press report of the discussion in court on this matter, leading to Judge Purdy's decision reversing that of Commissioner Lurton makes interesting reading:

Attorney Holcomb argued that in-as-much as the American consul at Dairen was assigned to Japan by the State Department it showed a tacit relinquishment of extraterritoriality. He pointed out that under the treaty with China the American court can sit wherever there is an American consul.

United States District Attorney Leonard G. Husar, prosecuting the case, pointed out that the consul was assigned to Japan merely as a matter of diplomacy and in no way affected the rights granted American citizens under the extraterritorial treaty.

Judge Purdy advanced an argument along a different line, contending that the real basic reason for extraterritoriality was to prevent American citizens appearing before Chinese tribunals. Hence with the withdrawal of China from the Dairen area the need of extraterritoriality automatically ceased.

"But that does not affect the treaties," countered the United States Attorney. "Despite Japanese leaseholding Manchuria is still part of China and as such, the provisions of the treaty remain applicable to all parts of it."

The court argued that as no claims to special rights had been made by the United States Congress during that last twenty years it was evident that they were not interested in such a claim.

"If Congress does not assert such rights why should you," Judge Purdy asked.

"We are interested in a lot of things that Congress is not because we live out here," was Mr. Husar's rejoinder. "Congress has not been called on to claim any rights."

"Suppose China should cede or lose Mongolia to Soviet Russia. Then after twenty years some American should get in trouble there. Do you think that we could apply extraterritoriality?" questioned the court.

The District Attorney replied that Kwantung was not lost to the Chinese republic but was merely leased to Japan for a period of 100 years. He strongly insisted that the treaty was the final authority and did apply to that area. He maintained that the United States could not stop China from giving up her own rights in certain areas but that China could not give up the rights of American citizens.

The court refused to alter its stand and granted the motion to quash, authorizing the return of the $500 bail put up for the accused.

The case hinges upon a circular letter sent to all consular officers in China by Secretary Hay in 1900 in which he notified them not to accept consular jurisdiction in cases in any of the leased territories in which China had withdrawn her officials and judicial tribunals.

The memorandum, after citing the provisions in the treaties between the United States and China in relation to extraterritorial jurisdiction, said: "By the leases made by the Chinese government of Weihaiwei, Kiaochow, and Port Arthur, to Great Britain, Germany, and Russia respectively, the *jurisdiction* of China over the territories leased is relinquished during the terms of the leases. In the case of Weihaiwei, leased to Great Britain, it is expressly provided that 'within the territory leased Great Britain shall have *sole* jurisdiction.' In the lease of Kiaochow to Germany, it is provided that China shall have no voice in the government or administration of the leased territory, but that *it shall be governed and administered during the whole term of the lease by Germany*; that Germany is at liberty to enact any regulation she desires for the government of the territory. Chinese subjects are allowed to live in the territory leased, under the protection of the German authorities, and there carry on their business as long as they conduct themselves as law-abiding citizens. Provision is made for the surrender to the Chinese authorities of fugitive Chinese criminals taking refuge in the leased territory. The Chinese authorities are not at liberty to send agents into the leased territory to make arrests. The lease declares that China '*retains her sovereignty over this territory*.' In the lease of Port Arthur to Russia it is provided that the control of all military forces, as well as of the *civil officials* in the territory, shall be vested in one high Russian official; that all Chinese military forces shall be withdrawn ; that the Chinese inhabitants may remain or go, as they choose ; that if they remain, any Chinese charged with a criminal offense shall be handed over to the nearest Chinese official to be dealt with. (Mr. Conger says that the Russian legation informs him that this last provision is not correctly translated, and that, construing it in connection with article 8 of the treaty of 1860, the Russian government has the right and does try Chinese for crimes committed against Russians.) This lease is expressly declared on the understanding that it '*shall not* prejudice China's sovereignty over this territory." As it is expressly stipulated in the leases that China retains *sovereignty* over the territory leased, it could doubtless be asserted that such territory is still *Chinese territory* and that the provisions of our treaties with China granting consular jurisdiction are still applicable therein. But in view of the express relinquishment of jurisdiction by China, I infer that the reservation of sovereignty is merely intended to cut off possible future claims of the lessees that the sovereignty of the territory is *permanently* vested in them. The intention and effect of these leases appear to me to have been the relinquishment by China, *during the term of the leases*, and the conferring upon the foreign power in each case *of all jurisdiction over the territory*. Such relinquishment would seem, also, to involve the loss by the United States of its right to exercise consular jurisdiction in the territories leased. And, as Mr. Conger suggests, as these territories have practically passed from the control of an uncivilized people to civilized, there would seem to be no substantial reason for continuing to exercise such jurisdiction."

These instructions have been followed for 25 years. They have never been counter-manded by other instructions. Americans in leased territories, such as Hongkong and Dairen, have appeared before British and Japanese tribunals in those territories. A practice has grown up based upon these instructions. To have amicable relations between the United States without consulting the State Department, to overrule a decision and practice of 25 years, to ignore every question of policy, is foolsome.

Judge Purdy is to be congratulated on a perfectly just and honorable decision !

The Recrudescence of Jingoism

The Supporters of Militarism in the United States Are Hitting at Japan in the Hope of Forcing Through Congress a Larger Naval and Aerial Program

Constant Nagging Bound to Lead to Unfortunate Results

Saner Influences at Work under Leadership of President Coolidge to Prevent Stupid Stampede

THROUGHOUT the United States, a part of the press has taken upon itself the task of nagging at Japan, of annoying Japan, of worrying Japan. This movement is fomented by large, well-financed, well-organized associations which subsist upon popular fear and excitement. The purport of the present argument is that Japan will build or is about to build, or is building, a huge aviation corps, which will be used in the next war, the Japanese-American war. These airships and aeroplanes will fly from Japan straight to the western coast of the United States and there will be nothing there to stop them from thus conquering the whole country !

What can more lead to suspicion, loss of confidence, loss of friendship than such fatuous discussions ? What can do more mischief that these wild statements, unsubstantiated by fact, unsound in theory ? If this section of the American press seeks to force the United States into a war with Japan, they are altogether overlooking the character of the Japanese. Proud, stubborn, fearless, the Japanese will endure much for friendship. And there is no nation whose friendship, whose sympathy and co-operation Japan seeks as much as that of the United States. Such movements as the one which is at present making itself heard in the United States will fail to result in a war between the United States and Japan, *because Japan wants no war. Japan wants peace. Japan seeks peace. Japan seeks only the opportunity to develop in Asia the resources, the man-power, the natural wealth of those places she occupies and those countries which seek her co-operation. And in these development operation Japan seeks American assistance and from giving such assistance, the United States shares in the fruits of the ventures.* Why disturb such a favorable situation by hideous and fulsome war talk.

The same sort of talk brought on the curse of the European war from which victor and vanquished have alike suffered. The same sort of talk in Europe prior to 1913, stirred up national antagonisms, which could find gratification only in the slaughtering of countless millions and the destruction of the monuments of centuries. Do the men who thrive on such dangerous and uncontrolled doctrines realize the mischief they do ? Do they understand what havoc they do to their own country ?

The *New York American* perhaps leads the way in this light discussion of serious problems :

> " Where, then, is the guarantee ? Where is America's bulwark—the bulwark that must assure her safety and protect her welfare if her safety and welfare are to be protected and perpetuated ? In America's navy, in America's adequate navy.
>
> " Without that adequate navy, America's ready wealth and colossal resources are but invitations to attack her. Only by an impregnable line of defense at sea can America's wealth and America's sovereignty over it be maintained in peace and advance without conflict. The men who would weaken the nation's first line defense, expose it to defeat by a naval enemy, risk its ruin and the desolation of American homes with it, are assuming the greatest responsibility that any American rulers have assumed in sixty years.
>
> " The gentlemen in Washington have been warned. They have been warned more frankly, more brutally, than any others have been warned in modern times. The warning has been written before their eyes, shouted in their ears. *None of us wished to see it or hear it.* But it has been forced upon us.
>
> " All the world knows this. In Europe it is reckoned with as a *certainty of the future. The only way to falsify the reckoning* and defeat the certainty is by doing what we have not done, what we hesitate to do, what some gentlemen in Washington even shrink from doing, and that is so to fortify ourselves at sea, in accordance with our treaty rights, that, safe from attack and assured in our welfare, we may say to all peoples, well intentioned or evil intentioned :
>
> " We Americans ought to fear God, but nothing else in all the world."

Read-Admiral Bradley A. Fiske, retired, is all a-tremble as to what might happen to the United States. He says in one place :

> " Certain *other nations are becoming stronger militarily,* while we are becoming effeminized. We can see, for instance, that in Japan the people are sternly repressing all tendency to luxury, and that a nation-wide movement, almost feverish in intensity, is acting to aggrandize its air force, even working women and little boys and girls contributing their mites. We, on the contrary, are becoming more and more addicted to luxury and pleasure, while gaudy fashion shops almost monopolize our grandest avenue.
>
> " At the present day the nation which exemplifies the most clearly and the most spiritually the intimate relation between patriotism and religion is the nation of Japan. To the Japanese, patriotism and religion are inseparably entwined, and both are embodied in the person of the Mikado.'
>
> " The three nations which represent this state the most are Germany, Russla and Japan. There are many thousands

> of extremely good people in this country, who live in comfort and enjoy the material benefits which the almost boundless wealth of our country confers upon them, but who fail to realize that the people of Germany, Russia and Japan do not live in such luxurious surroundings and that they cannot be justly blamed if they envy us. They realize that we have obtained it largely by means of war, and they can lardly be blamed if they say to themselves that they can get from us what we have because they are more skilled in war.'
>
> "To accentuate their quite natural ambition is the profound conviction that they have been treated unjustly by the United States. We do not think so, but they do. Especially do the Japanese feel this, for our action toward them has not only been of a kind harmful to their national interests, but couched in terms they believe to have been made intentionally insulting. Whether they are right or worng in this matter, there is no recognized standard in this poor world of ours by which we can decide. The important point is that they think themselves right, and that the paramount cause of wars has been just that combination of a conflict of interest with a conviction on each side that it is right, which now exists between our country and Japan."

The answer of the *New York City Post* is perhaps a better one than we could think out. It is headed, "Cold Statistics," and gives them :

> "Amid the loose talk about naval rivalry between Japan and the United States the two governments are preparing their naval budgets for the mext fiscal year. The United States will spend, in round numbers, $300,000,000 ; Japan a little over $100,000,000.
>
> "Contemplation of these figures by the loose-talkers should reassure them that the United States is rather more than holding its own. The comparison scarcely supports the argument that the American navy is being allowed to suffer from lack of funds while that of Japan is continually forging ahead. But the jingoes in neither country will permit plain facts to come between them and their reckless propaganda.
>
> "It is granted that statistics may be adduced to prove almost anything. It is probably true that the Japanese navy benefits to a greater extent by the expenditure of a given amount than does the American navy. There is no unit by which an exact calculation can be made.
>
> "Those who prefer, to take their statistics cold might consider the naval budgets of the two powers over a period of five years. A comparative table might roughly be drawn as follows :

Years	United States	Japan
1920-21	$787,000,000	$187,000,000
1921-22	425,000,000	248,000,000
1922-23	298,000,000	138,000,000
1923-24	297,000,000	198,000,000
1924-25	300,000,000	112,000,000

> "A fair-minded American would have difficulty finding a Japanese menace in these figures."

One can quote the jingoes *ad infinitum* and with an equal amount of disgust. In every time, in every country, there is the single-tracked mind, the unlearning, unthinking, megalomaniac, the fighter of dragons and pink elephants, whose creed may be summed up in the single phrase, "Carthage must be destroyed!" For a day, they have their say. They furnish sensational newspapers with sensational copy. They appeal to the fear psychology of the mob. They play upon the patriotic instincts of a people with wild yet plausible accounts of what might happen.

Again such, the *New York World*, maintains the calm, enlightened, liberty-loving policy of its great publisher, Joseph Pulitzer. During a long career, there was never a time when Joseph Pulitzer failed to attack injustice or curried to popular favor by the fomenting of mean prejudice. The *New York World*, continues this broadminded, big-hearted attitude. In a number of editorials, the *World* has attacked the constant nagging of the jingoist. Opposing the Pacific manœuvres in an editorial entitled, "A Matter of Tact," the *Evening World* said :

"There is nothing remarkable in the hostile attitude of a large element of the Japanese toward our plans for naval manœuvres in Pacific waters. These manœuvres were certainly not planned as a defiant gesture to the Japanese, but, however harmless our motives, we are under suspicion in Japan, and this suspicion is being fed by the demagogues and touble-makers. These manœuvres give the jingoes the opportunity they seek. Much can be said against the timeliness of the naval demonstration.

"Under existing conditions it would have seemed the part of wisdom for the naval authorities to have taken the diplomatic situation into consideration. The contention of the navy department that we have 'a right' to have the manœuvres in the waters of our own island possession is not impressive, albeit true. It is not a question of right, but of tact.

"With the best intention in the world we have made a number of successive blunders in our relations with the Japanese, and this one might well have been prevented through a better co-operation between the state and navy departments."

The morning edition of the paper uses no fine phrases in speaking of the jingoes :

> "American jingoes who have sought to spread suspicion against Japan may not be silenced by any reassuring words from Secretary Hughes. Their minds are mostly proof against arguments and proof against facts. But the American people cannot fail to listen when the secretary of state says that 'there are no issues whatsoever between the two countries endangering the existing cordial relations.'
>
> "Nor will they fail to take note of it when Mr. Matsudaira, the newly appointed Japanese ambassador to the United States, and Baron Hayashi, the Japanese ambassador in London, speak in the same vein. To those still in a reasonable state of mind such official declarations from both sides must be conclusive. More than that, they indicate the purpose that the existing cordial relations shall be preserved.
>
> "Baron Hayashi makes it clear that there are 'jingo elements in various countries of the world, my own included,' who practice the same methods of misrepresentation. He is no less right in saying that they are 'disregarded by the bulk of their nationals.'

"For jingoism is an industry fostered by a certain class of politicians everywhere. They play into one another's hands at long range by inciting trouble. What a Britten may say in Washington carries no weight in this country. The Chicago man's antics are old stage play. But in Japan, where he is not known, there is danger that they will be misunderstood. So a Japanese politician in Tokio may discharge frothy talk and his words, disregarded there, acquire undue importance in the United States through ignorance of his standing. It might help if Representative Britten could be sent to Japan for exhibition and some of the Japanese jingoes of whom Baron Hayashi complains were brought here for inspection."

The *Columbus Ind. Ledger* continues in the same vein :

> "We are suffering here in America from the presence of individuals or interests that seem to take general delight in nagging and ragging Japan. There is no apparent reason why this should be done. The two countries are wide apart and do not come into close neighborhood relationship. The number of Japanese in this country is not so large that they threaten our business or industries ; and this number will not increase under the present immigration law. We do not covet any territory possessed by Japan ; and that country is making no hostile move toward any part of our own territory. Japan is a good customer of the United States, and we have and still continue to enjoy excellent commercial relations through Japanese connections.
>
> "But in spite of these friendly and pleasant conditions, the raggers, and jingoists and naggers keep up their gadfly tactics with a persistency that is little short of amazing."

President Coolidge, Secretary Hughes and now even Secretary of Navy Wilbur are calling a halt to this vicious and insidious propaganda against a friendly nation. In a statement issued in Washington on February 1, Secretary Wilbur said :

> "A good deal is being said just now concerning the terrors of the next war. It is stated that in the next war whole cities and whole populations will be obliterated by the awful means of warfare devised by science, that poison gas and disease germs and high explosives will do their dreadful work in destroying not only troops but civilians—men, women and children as well.
>
> "These statements are not true and are not justified by past history or present conditions. The fact is that we have the 'next war' going on right now in China and there have been 'next wars' since the world war. The writers who seek to terrorize the people by the statement of the awful calamities of the 'next war' overlook the one fundamental principle of war, that to have a war one must have a defense and that the means of defense should be commensurate with the offense.
>
> "If poison gas can be used on one side it can be used on the other, as Germany found out to her sorrow. If disease germs can be used on one side they can be used on the other. Moreover, the nation using disease germs as a means of offense cannot confine the effects of disease to one side of the fighting line. You can't keep small-pox or any other disease on one side of a given line, and what will render the soldiers on one side of the line immune to disease will render the soldiers on the other side of the line likewise immune.

"There is no need of scaring ourselves or allowing our women and children to be frightened by such stories. There is no doubt that modern warfare is a serious and frightful thing as we have so lately been reminded, and that unpreparedness for such war and its possibilities is inexcusable in any nation that has the means of preparing to avoid its hideous possibilities."

The sound men, the responsible men of the country are fighting this war propaganda as one fights a plague. They are attacking it from every angle. They are appealing to the good sense and decency of the American people. But who is behind all this war talk ? What interests are served in stirring up one nation against the other ? Who is doing it ?

Some American living in China, at one time, were interested in such a movement. They are not interested in it now. They once proposed that the United States go to war with Japan in the interest of China. No one would favor such a project now. They once conducted a propaganda to show how badly China had been treated by Japan and how worthy China was of universal sympathy. No one would argue like than now. China has her own problems and in due course will solve them in her own way. But such a solution can be achieved more easily through the active co-operation between Japan and the United States sooner than by a war, which could bring only misery to millions of Chinese.

Let us stop talking war ! Let us build in peace !

China Protests in Vain

Objection to Japanese-Soviet Agreement Untenable

CHINA'S protest against the Japanese-Russian Treaty as violating the sovereign rights of China because of the recognition of the treaty of Portsmouth of 1905, has impressed neither Soviet Russia nor Japan. The Russian view is that China has had many opportunities to come to an understanding with Russia, but was unable to make up her mind. Influence by the legations in Peking, hampered by petty jealousies among her own officials, disunited, uncertain chaotic, China has lost every opportunity of taking advantage of the Soviet offers. First, Mr. Yourin came along with proposals which fitted perfectly with China's aspirations. They were rejected. Then Mr. Joffe tried and he failed. Mr. Karakhan succeeded in signing a preliminary agreement but the intervening civil war, made further efforts in this direction difficult, if not impossible. Now, Dr. C. T. Wang has again been appointed to write a treaty with Russia, but it is uncertain whether he will accept the appointment, without some guarantees that when he shall have achieved success, some official will not interfere for internal political reasons, as Wellington Koo did the last time, and that any treaty signed will be recognized nationally.

The heart of China's present international difficulties arises from the disorderly provincial autonomy now actually the political system of China. Were provincial autonomy constitutional and orderly, there can be no doubt but that it would be the most satisfactory form of government for China. As it is, there is no system, no definite organization. Each province, or each group of provinces under a particular militarist does more or less as it likes. Before the Sino-Soviet preliminary treaty could become operative, a separate treaty had to be written with Marshal Chang Tso-lin, who controls the territory, North Manchuria, in which Russia is principally interested in China.

The Chinese Eastern Railway and its control was the problem which faced the central government in Peking, Soviet Russia and Marshal Chang Tso-lin. The railway was being managed by so-called " white " Russians on the basis of the original agreement between China and Russia, the Russo-Asiatic Bank, acting for Russia. When the preliminary agreement was signed between Soviet Russia and China, the Ministry of Communications believed that the management of the railway would revert to it. Dr. C. C. Wang, an experienced railway official, one of the most competent in China, was actually president of the Chinese Eastern Railway at the time. Marshal Chang Tso-lin, on the other hand, was at that time not on speaking terms with the central government. He was, as a matter of fact, independent of the central government and anticipated that he might at any time be called upon to defend his territory against an onslaughter by Marshal Wu Pei-fu, who then controlled and managed the central government. Marshal Chang soon dispossessed Dr. C. C. Wang from his position on the Chinese Eastern Railway, took possession of it himself and appointed his own man as president. The " white " Russian general manager, Mr. Ostrounoff, was clapped into prison, where he still is and a Soviet régime ensued.

The Soviet agreement required that an equal number of Chinese and Russians shall be employed on the road, but by all accounts, the road is constantly becoming more Russified, China losing her control altogether.

In view of China's complete mishandling of her relations with Soviet Russia, it is not at all surprising that Mr. Karakhan sent a rather sharp reply to China's protest against the Russo-Japanese agreement of January 20, 1925. Mr. Karakhan said :

" Now, I feel bound to state that the said note of your excellency, dealing with that stipulation of the convention signed between the Union Soviet Socialist Republics and Japan which refers to the Treaty of Portsmouth, caused me a great surprise, and I am constrained to lay down that your excellency's protest against the recognition of the validity of the Treaty of Portsmouth is so *much in contradition with the true significance of this act that* it could at the best be explained by an inadequate examination of all the international acts pertaining thereto and—which is more regrettable—by fully ignoring those acts which the Chinese government has itself concluded with Japan.

(1) " Being mindful, to a degree which is well known to the Chinese people, of the sovereign rights and interests of China, the government of the Union of Soviet Socialist Republics, in its negotiations with Japan, did not agree to recognize the validity of the Treaty of Portsmouth until, after a thorough and most careful study of the eventual consequences of such recognition, it was clear beyond any possible doubt that the recognition in 1925 formally of the validity of the Treaty of Portsmouth, which was concluded and put into effect in 1905, could not in any measure effect the rights or interests of China whatsoever.

" Your excellency's protest would have been quite timely and have had perfectly reasonable grounds twenty years ago, when the treaty of Portsmouth was being signed and when the Tsarist government—with the *sans-gene* peculiar to an imperialistic power —felt itself in China like a master in his own home and, without the knowledge of the Chinese government, ceded to another country the territories and rights which the Tsarist government had itself seized in Manchuria. However, the Chinese government not only failed to offer any opposition to the Tsarist government, but by two acts which were signed between China and Japan in Peking on December 22, 1905, the Chinese government itself recognized all the rights of Japan that had been ceded to the latter by the Tsarist government on the strength of the Treaty of Portsmouth. Consequently, as early as on and from December 22, 1905, the Treaty of Portsmouth lost all its significance as an international act in any way affecting the interests of China. Moreover, in 1915, on the strength of an agreement concluded between China and Japan directly and without any reference to the Treaty of Portsmouth, the rights which, twenty years ago, have been ceded to Japan by the Tsarist government, were established on a new formal basis. I may be permitted here to invite your excellency's kind attention to the fact that those rights which have now apparently caused the protest on your excellency's part were fixed in 1915 for terms many times longer than those which were granted by China to the former Russian imperial government.

(2) " However, notwithstanding the fact that the recognition in 1925 of the formal validity of the Treaty of Portsmouth could not in any way prejudice the interests of China, the government of the Union of Soviet Socialist Republics nevertheless deemed it necessary, in a special declaration signed on the same day as the convention of January 20 of this year, to exonerate itself of all political responsibility for the contents of the Treaty of Portsmouth."

Developments in the Far Eastern Iron and Steel Industry

WITH the announcement of another loan of Yen 8,500,000 from the Yokohama Specie Bank to the Han-Yeh-Ping Coal and Iron Company, the reports of a strenuous campaign being carried forward in Japan for the merger of governmental and private steel mills, the prospect that the Anzan Iron Works of the South Manchuria Railway Company will be placed on a profitable working basis and the erection of a new steel plant in East Borneo, interesting developments are taking place in the Far Eastern iron and steel industry which may have a far reaching effect on present trade conditions.

Han-Yeh-Ping Loan

It is no secret that the affairs of the premier Chinese industrial enterprise are in a bad way or that prolonged negotiations have been taking place in order to obtain further financial assistance from Japan.

It is not always possible for outsiders to guage correctly the real nature of the difficulties which operate to keep Chinese directed enterprises from making a profit, but it seems to be generally accepted in commercial circles that unless a revolution is effected in the management of the Han-Yeh-Ping Company, the great works and mines at Tayeh, Hanyang and Pinghsiang will pass under the control of these Japanese interests who have already advanced about Yen 45,000,000 to the company since 1913—two and a half times its paid-up capital of $18,000,000. In any comment on the affairs of this company, it is only fair to state that internal conditions in China have been largely responsibility for its present unfortunate condition. The operations of the military war-lords have cut the railway to the north and south of Hankow and stopped the coal supply. Faced with a shortage of coke, the Han-Yeh-Ping Company has been importing it from Japan at an excessively high cost. As a consequence, one furnace at Hanyang and one at Tayeh belonging to the company as well as those owned by the Yangtsze Engineering Works at Hankow have been to close down. Only 200 tons of pig iron a day are being turned out at Tayeh and none at Hanyang, where the normal output was 400 tons per day before the coke shortage.

Finding itself in further financial straits and failing to obtain relief in China, the company was compelled to turn once more to its Japanese creditors for an additional loan to carry it over. At the last annual meeting held in December, the shareholders approved the negotiations for a new loan from the Yokohama Specie Bank, the accommodation being in the nature of an extension of the original agreement of 1913 under whose terms it represents an advance payment for iron to be delivered to Japanese interests. The proceeds of the loan are to be applied in large part for the purchase of new plant and machinery, which will enable the company to produce 400,000 tons of iron annually and to redeem several short-term foreign and native loans concluded at higher rates of interest. It is understood that the rate of interest is 6½ per cent. and that amortization is to commence in 1928, in order to enable the company to reorganize its administration and expand its selling organization in China and foreign countries. Following the lines of the original loan agreement of 1913, the new conditions give to the Japanese lenders preference in purchasing the products of the company at prices to be mutually agreed upon.

Japanese Steel Merger

The new lease of life given to the Han-Yeh-Ping by this last loan has given rise in Japanese steel circles to the fear that if the Hanyang steel works are improved and brought up to full producing capacity its surplus products will be dumped on the Japanese market at prices ruinous to the domestic industry. To provide against this contingency, Mr. K. Takahashi, Minister of Agriculture and Commerce, has proposed a merger of the principal Japanese private and government steel mills in a single corporation with a capital of Yen 200,000,000.

The general plan of the proposed scheme is as follows:

1. The proposed ironworks shall be composed of the following concerns: the Government Steelworks at Yawata, the Rinsei Steelworks, the Fusan Iron Foundry, the Japan Steel Company, the Mitsubishi Iron and Steelworks, and the Oriental Steelworks.

2. The new concern shall be a semi-official organization with a capital of Yen 200,000,000.

3. The government shall be the holder of Yen 900,000 of shares, in exchange for the property of the Government Steelworks at Yawata

4. Shares amounting to Yen 110,000,000 shall be distributed among the owners of the private steelworks to be amalgamated, in exchange for the property.

5. The government shall assist the new concern in securing Yen 50,000,000 one year after its establishment, either in the form of loans or shares. Of this amount, Yen 40,000,000 shall be used by the concern as its operating expenses, and the remainder for establishing various facilities and improving them. The concern shall secure another Yen 10,000,000 in a similar way two years after its establishment.

6. The government shall give subsidies to the concern for 15 years after its establishment, unless the concern is able to pay a six per cent. dividend on shares other than those held by the government. Where the profits do not allow of a six per cent. dividend, no dividend shall be paid on the shares held by the government. When the dividend on the government's shares reaches 3.5 per cent., a special dividend shall be paid to civilian shareholders. Such special dividend shall not exceed four per cent.

7. The following shall be carried out in the first year:—
    - (*a*) Different works shall co-operate in supplying raw materials like iron ore, coal, etc.
    - (*b*) Unified purchase and distribution of raw materials.
    - (*c*) Readjustment of supply with demand and efficient distribution of different tasks to different works.
    - (*d*) Unified in selling and distributing of products.
    - (*e*) Readjustment in employment of operatives.

The plan also includes the building of ships and the establishment of other facilities.

Mr. Takahashi's plan received the approval of the Ministry of Finance and the Cabinet then appointed an expert commission to study and report on it. It was accepted that from the standpoint of both the industrial development and the national defense, some semi-official combination is essential, but the Cabinet reserved its final approval pending a full investigation with detailed accounts of the loans and subsidies upon which its success is premised. Explaining the object of the commission, Mr. Takahashi says it is to decide whether the steel industry in Japan can be made a unified national industry, and become the major industry of the country. He believes that the prosperity or failure of the steel industry will have a decided bearing upon Japan's future and that if the merger fail a change must be made in the industrial policy of the country.

Considerable opposition to Mr. Takahashi's plan has been raised by some of the independent steel concerns who claim that there is nothing new in the proposed merger. A similar plan was drafted at the close of the great war, when many of the new steel concerns found it difficult to carry on during the depression which followed. In fact, several bills having the same general object in view were drafted and submitted to the Diet by interested parties for the purpose it is claimed of manipulating the stock market. It is, however, admitted by everybody interested in the industry that some unification of the national iron and steel industry is absolutely necessary, but any plan that makes the government works at Yawata the nucleus of the Combination and hands the industry over to government control with the power to appoint directors and other officials, is bound to bring disaster.

New Iron Extracting Process

The campaign for unifying and nationalizing Japan's iron and steel industry had hardly started when the announcement was made that a new method of extracting pure iron from iron sand and iron ore had been perfected by Dr. Masatoshi Okochi, chief of the research institute which bears his name and a member of the House of Peers. His method is based on electrical dissolution and, it is claimed, that it will revolutionize the industry in Japan where enormous deposits of iron sand are found in several localities. Considerable stir was created in the Japanese industrial world over this development followed by the announcement that Dr. Okochi intends to resign his seat in the House of Peers to devote all his time to his discovery.

Enormous Iron Sand Deposit

Two weeks later, equally startling announcement was made that another new process had been invented, and that deposits in northern Japan had been located containing billions of tons of iron sand that would supply the national requirements of Japan for centuries.

The location of the deposit has lomg been known, but it was only recently that the process for extracting the iron was reported to have been perfected by Mr. Goro Matsukata, a son of the late Prince Seigi Matsukata, who has been experimenting since 1917. A smelting plant operated in secret by Mr. Matsukata in Kuji Bay is reported to have obtained 30 tons of iron from 1,500 tons of iron sand on December 8. The plant is to be enlarged to such an extent by next October that it will yield between five and six hundred thousand tons of iron a year.

It is said that the quality of the iron sand is excellent, and the field in Kuji contains at least 1,500,000,000 tons of iron. The deposits far excel the Tayeh mine of China, whose resources are estimated at 20,000,000 tons.

Mr. Matsukata is planning to increase the capital of the plant to Yen 20,000,000 and develop the mine to an extent that there will be no more need to import iron.

The "Ferrocoke" Process

The invention of Mr. Goro Matsukata is known as the "Ferrocoke" process of smelting.

A writer in *The Japanese Times* says the process is comparatively simple. After the ore is mined it is washed or "milled," the gravel being washed away and the concentrates remaining. When coal is made into coke a certain percentage of concentrates are added to the coal of the coke ovens and instead of the ordinary coke a substance called "Ferrocoke" is produced. The Ferrocoke, which is a combination of fuel and ore, is then the only substance fed to the blast furnace with pig iron and slag as the ultimate result.

The process at the same time can eliminate or reduce the quantity of titanium contained in the original ore and the pig pig iron manufactured is of the highest quality.

One blast furnace is already operating on the shores of Kuji Bay and the following percentages have been established as a safe average. From ore to concentrates forty per cent. and from concentrates to iron fifty five per cent.

In other words, 2,500 tons of iron sand will yield 1,000 tons of concentrates, which again will produce 150 tons of iron.

The iron can be produced at a figure easily competitive against prices on imported products. The greatest expense in the production is the item of coal.

While some coal mines may be found in northern Honchu. the coal mined there is too inferior for coking purposes, and it has been necessary to import coal from Hokkaido.

If good coal can be found in the vicinity of Kuji it will still further reduce the cost of iron production and in this connection it is of interest to note that fishermen have found seaweed in Kuji Bay with a first-class quality of coal hanging on the roots. It is therefore quite possible that suitable coal may be found on the small peninsula to the north of Kuji Bay.

The fact that the blast furnace is located on the shore of Kuji Bay will greatly facilitate and cheapen the shipping of the iron. In the course of time piers and wharfs will undoubtedly be erected in order to expedite the discharging and loading of steamers which is now being done by lighters running through the surf.

Anzan Program

In addition to the above developments in Japan's steel industry are the improvements now being carried out at the Anzan Iron and Steel Works, operated by the South Manchuria Railway Company in Manchuria. These works have been operated at an immense loss to the railway company owing to the low grade character of the iron ore deposits. After many experiments, however, the engineer of the works has perfected a concentration system which has proved such an unqualified success that the company has adopted it as the basis of a new extension program. The first stage of this program is being carried out this year by the erection of reduction furnaces and concentration plant which if successful is to be supplemented by a steel plant and rolling mill.

Protective Measures

The new steel program being pushed forward by Mr. Takahashi in Japan includes raising the duty on imported iron and a revision of the law for the encouragement of the domestic pig iron industry.

The prevailing tariff on imported pig iron is 10 sen per 100 *kin*, but this is offset by a conventional tariff of 8.3 sen per 100 *kin*. Mr. Takahashi proposes a 15 per cent. *ad valorem* duty on inported steel materials and 10 per cent. *ad valorem* on pig iron, and as this will include all imports from China, it materially affects the position of the Anzan works of the S.M.R. and the Penchihu works operated by the Okura Company and the Chinese government authorities in Manchuria. Both of these enterprises, created in order to assist in supplying the national requirements of Japan will be hard hit, unless some special protection is extended to them.

Effect on Chinese Industry

If the "Ferrocoke" process invented by Mr. Matsukata or the electric dissolution process of Dr. Okichi is successful in profitably utilizing the large iron sand deposits of Japan and the nation can be made independent of foreign supplies, Japan will probably follow the lead of America in raising a tariff wall high enough to protect the home industry from foreign competition. The development of the new process will be followed with keen interest as its success means that the huge Japanese investments in Chinese iron mines and blast furnaces (including the Yen 50,000,000 loan to the Han-Yeh-Ping) will become almost a dead loss unless the Chinese market is developed to the point where it will consume its own output.

Borneo Steel Mill

While these developments are taking place in Japan the Dutch project for establishing a steel plant in East Borneo in being pushed through.

In answer to a French statement that the soul of this enterprise was German, the Gazette d'Hollande recently gave out the following information :—

"The truth is that the initiative of the enterprise was purely Dutch, supplemented by foreign capital for its realization, but with the express reserve that the company should retain definitely its Dutch character, and that the Dutch government should be represented on the board of the company by a commissary furnished with special powers. All this is found explicitly set forth in documents which have been submitted to the Volksraad (Netherlands-Indies National Council), which include also the regulations of the "Société Anonyme des Fers et Aciers de Borneo." When the project was being discussed openly in the Volksraad in November, 1923, the question of the international character of the enterprise was brought up, and it was authoritatively stated that the company was representative of twelve important Dutch business interests. The capital was authorized at fl.70,000,000, the colony of the Netherlands Indies receiving fl.20,000,000 in shares in return for special concessions made by them to the company. The government further received half of the founders' shares, which carry with them special rights. If, in addition, one takes note of the founders' shares received by Dutch participants themselves, it is evident that the majority of shares of this sort pass into and remain in Dutch hands.

A member of the board of administration will be nominated by the Dutch Minister for the Colonies, and the other members elected by the holders (mostly Dutch) of the founders' shares. Two-thirds of these members are Dutch, and reside either in Holland or in the Dutch East Indies. In a word, the majority of the directors must be Dutch. On the other hand, it goes without saying that if this new blast-furnace industry becomes an accomplished fact, which is not yet assured, it will seek to produce on as large a scale as possible, and will only be following the example of its predecessors in seeking to find a market for its products amongst Far-Eastern consumers. This appears to make it sufficiently clear that, although there may possibly be some German shareholders, they certainly have no part in the control of the company."

Johore Iron Ore Exports to Japan

An interesting sidelight on Japanese activities in developing iron deposits in Eastern Asia is seen in the return of exports from the state of Johore in the Malay peninsula. In 1920 an iron deposit was discovered at Bakit Medan by Japanese prospectors. Development work was commenced at once, and all the ore shipped to Japan. In 1921 it was 74,250 tons, value £86,636; in 1922, 111,090 tons, value £129,605; and in 1923, 154,161 tons, value £149,344. For 1924 (nine months) it has been 160,723 tons, value £128,936.

In 1923 the labor force employed numbered 990, and an 80 h.p. air compressor plant was to be installed for drilling purposes. To transport the ore down the river to the sea thirty-one tongkangs and eleven launches and tugs are employed by the company.

Mining Protective Appliances

WE have received an instructive catalog illustrating and describing Messrs. Siebe, Gorman & Co.'s breathing and all other safety, protective and first aid appliances. The appliances are useful for fire brigades, mining companies and similar enterprises requiring protective breathing appliances. Simplicity, compactness, absence of complication are the characteristics of these appliances, which are so arranged that telephonic and speaking apparatus are attached to the oxygen tubes. The agents for Messrs. Siebe, Gorman & Company, Limited in the Far East are the Jardine Engineering Corporation, Ltd.

The Iron Mines of Hsuanhua

A monograph has been published by Professor George B. Barbour, of the geology department of Yen Ching University, on the iron mines of Hsuanhua, Northern Chihli, which describes the Hsuanhua mines as being the most important workable iron deposit in China, although it was unknown to the explorer Baron von Richthofen. Professor Barbour says:

"After tunneling under the great wall at the head of the Nankou Pass, the Peking-Suiyuan Railway comes out on the edge of the upper river basin, and has an almost level run of 80 miles to Kalgan, where the Mongolian caravan route strikes north towards Urga. Twenty miles before reaching Kalgan, however, the train stops at the walled city of Hsuanhuafu, which almost hides a narrow gap in the long wall of hills that rise steeply half-a-mile north of the town.

"This innocent-looking ravine appears to be blocked behind by other hills, but the gorge divides abruptly and the eastern opening dives into an irregularly shaped cup in the mountains, which has been half-choked with loess, silt, and river-gravel. The east rim of the cup is formed by Yen-tung-shan (Chimney Mountain), which belongs to what is the richest sector of the iron-field, and the only one so far developed . . .

"The extensive dissection of the mountain by stream action has laid bare such a length of outcrop all around the mountain that the deposit has been worked from the surface by the 'open-pit' method. So far, only one tunnel has been driven through other rock to strike the ore underground.

'The pits being on the hill-side, the ore can be loaded into one-ton trucks, which are hitched to a cable and run down inclined tracks under gravity. The weight of the loaded trucks serves to haul up the returned 'empties' . . .

Ford Building Electric Engine

HENRY Ford is building the largest and most powerful electric locomotive in the world, which, when completed, will be used on the Detroit and Ironton Railway, the latest addition to his railway interests, and operating in conjunction with the Detroit, Toledo and Ironton Railroad. This super-engine, which is now under construction in the power house at the Highland Park plant of the Ford Motor Company, presents a most important development in the electrication of steam railroads, and at the same time a radical departure in locomotive construction.

The locomotive is not only novel in electrical design, but embodies many new and important ideas in mechanical design. In size it will be prodigous. It will weigh 340 tons, will be 117-ft. long, fifteen feet and ten feet wide. It will have sixteen pairs of driving wheels and will be capable of hauling a train of 150 or more loaded box cars, each weighing approximately 50 tons. The engine will not be built for speed, the purpose being to use it for freight service exclusively. Its running speed will be seventeen miles an hour, and its maximum speed thirty-five miles an hour.

One of the unique features of this great electric motive unit is that it carries its own converter station. This eliminates establishment of substations along the route, a practice at present general in railroad electrification. Through a regenerative braking system the Ford locomotive will have the ability to develop electric energy at any speed from maximum to practically a standstill.

The mechanical parts of the new locomotive are being designed and built by the Ford Motor Company, while the electric equipment is being built by the Westinghouse Electric and Manufacturing Company under Ford supervision and according to Ford specifications. Another feature of importance is that the trolley voltage adopted for the Detroit and Ironton Railroad electrification is 22,000 volts, twenty-five cycles, alternating current, a trolley voltage twice as high as any previously used in this country.

The Founder of the Chee Hsin Cement Co., Ltd.

THE story of a Chinese official who has done much for the development of the industry of his country is given in the biography of H.E. Hsuehsi Chih-chi Chow published by La Librairie Francaise, Tientsin. Mr. Chow, an ex-minister of finance, is connected with the following institutions: Director-general, National Cotton Improvement Bureau, president Wah Hsing Cotton Spinning & Weaving Co., Ltd., director, Wusih Kwang Chin Cotton Moll, director, Peking Waterworks Co., Ltd., president, National Industrial Bank of China, president, Hwa Hsin Bank, managing director, Lanchow Mining Co., Ltd., managing director, Chee Hsin Cement Co., Ltd., managing director, Pu Yu Machinery Co., Ltd., chairman, National Association of Mining Companies.

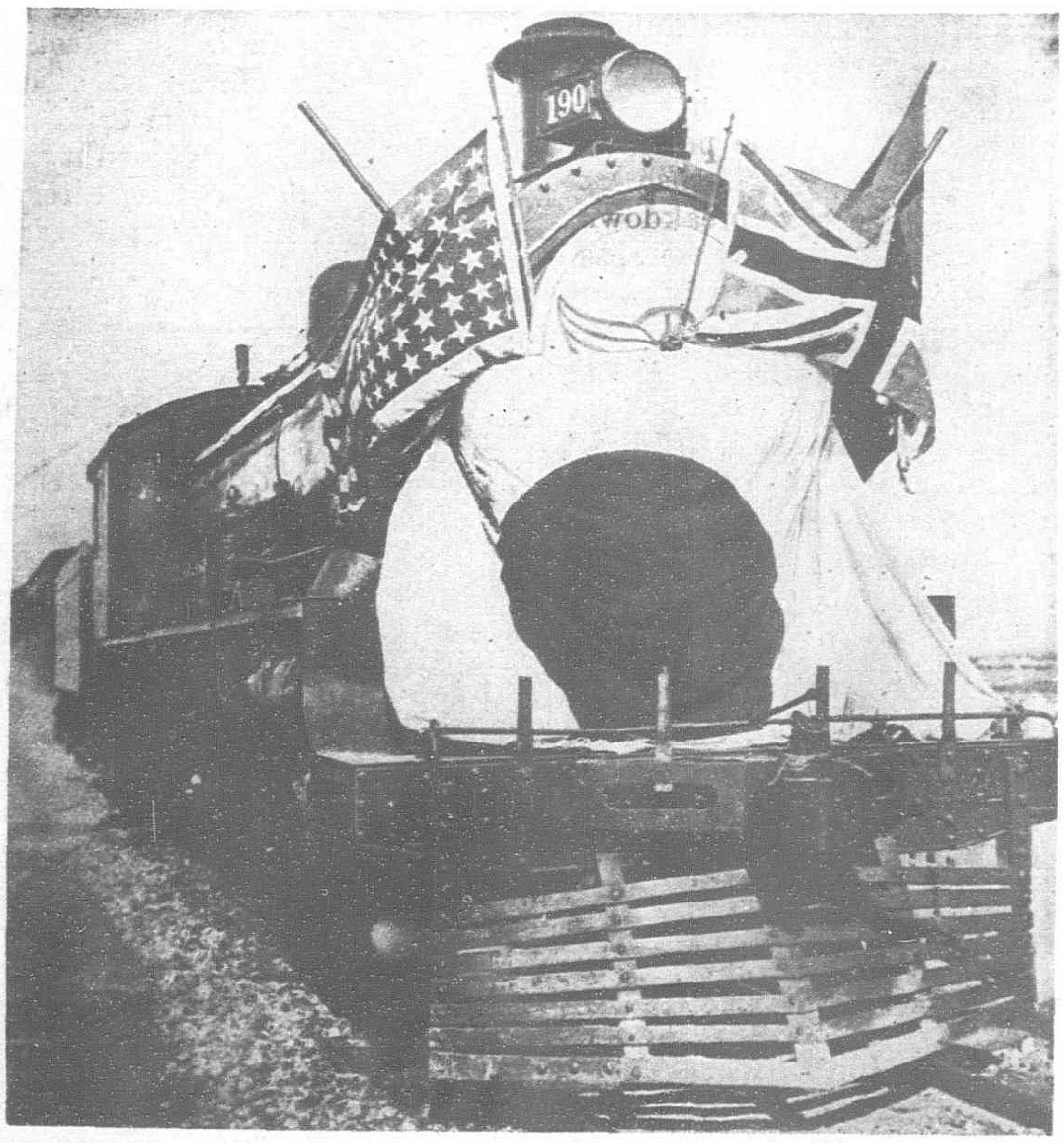
Mr. Chow's activities in connection with the Chee Hsin Cement Company, Ltd., are particularly interesting. In 1900 Mr. Chow stepped in where his predecessors had failed and resolved to make another attempt. He appointed Mr. Li Shi-ming and Dr. Gunther to organize the Chee Hsin Cement Factory, the capital being advanced from the then existing Kaiping Mining Adminstration. Soon afterwards, the Boxer troubles broke out and this enterprise found itself in serious financial difficulty. Through the efforts of Mr. Detring, at that time Customs Commissioner of Tientsin, the Chinese Engineering and Mining company advanced funds to the company and obtained a lien on its products with an understanding that the arrangement might terminate at any time on giving three months notice. In 1906 the restitutuon to Chinese control was effected by Mr. Chow and owing to the obsolescence of the old plant, new capital was raised to instal a new plant. The sponsors of this movement, H.E. Hsuehsi Chih-chi Chow and Mr. Sun Tao-sun were appointed general manager and assistant general manager respectively. Under this management, the company was carried on more successfuly than at the first attempt. The sub-depôt at Machiakow was established in 1908. At an extraordinary general meeting of the shareholders in December, 1911, it was resolved to form a new company in accordance with the commercial law of China for limited liability companies, to take over the undertaking of the original Chee Hsin Cement Co., Ltd.

China's Railways

Deplorable Condition of Railway System Due to Civil War and the Seizure of Cars by Militarists

DURING the recent civil war in China, which, by the way, is far from being concluded, the railways of the country were utilized by various generals for the transportation and quartering of troops. The rolling stock, including the very fine "Blue Express" cars, were seized by the various commanders who used them for their own purposes, in a shabby, thoughtless manner. The locomotives were taken from one line to another, each commander hoarding as many as he could get, against the possibility of a hasty retreat. First class passenger coaches became the field headquarters of generals; third class coaches, the barracks of the troops. The destruction of property has been very great, but during the days of fighting there was no power in the country strong enough to gainsay the arrogant militarists.

It must be borne in mind that during the whole period of the war, commencing at the end of August and not yet altogether over, passenger and goods traffic was altogether dislocated. The merchants, particularly foreigners protested, but in vain. No one could question the right of a military man to do anything he pleased, to destroy private or national property, to imperil foreign obligations or domestic responsibility. In a military oligarchy, the whims and wishes of the soldiers transcends all else.



The International Express from Peking to Tientsin; the only safe train for travel out of the capital during the stirring days of the last war

Mr. Yeh Kung-cho, Minister of Communications, an experienced railroad man, states the case clearly and forcefully in a memorandum to the government. He says:

"Worse is the fact that not only have communication affairs not been actively promoted, but they have been thwarted in many respects, revenues along this line being detained, railways being offered as security for negotiating loans, employment of officers and even workmen being interfered with, soldiers and high officials being always exempted from being charged, cars and locomotives being detained in great numbers.

"It was estimated that, up to September, 1924, no less than $707,300,000 should enter the debit side in carrying on (by no means promoting) communication affairs. This figure has neither greatly increased nor decreased, remaining somewhat the same at present. What is most lamentable is that a process of undermining has been going on in the economical foundation of these communication affairs. Scarcely can a balance be kept between receipts from and expenditure for these communication enterprises. Formerly, though the payment of domestic loans had frequently been delayed, foreign loans never failed to be duly repaid. But this is not the case at present. Foreign creditors such as the Japanese Specie Bank, the Ta Pei Company, the Ta Tung Company, and others as domestic creditors suffered delays repayment of both the principal and the interest. As a natural result of this, the credit of the authorities of communications has been destroyed to a large extent."

With the railways so disorganized, it is only natural that the financial obligations of the Ministry of Communications should not have been met. It is interesting to note that Mr. Yeh Kung-cho gives his figures up to September 12 of last year. This is probably due to the political situation in China. The figures would have been much worse if they were given up to January 1, 1925, for they would then have included the three worst months of the war, when the ministry of communications had practically no revenue.

Mr. Yeh gives three methods of solving the problem:

"1. Those, which can be duly paid with available resources as such as the Tsin-Feng Railway loan, Tsin-Pu Railway loan, and Fu-Ling Railway loan, amounting to a total sum of more than $319,200,000. They have and will be regularly paid by the revenues of these railways.

"2. Those which should be liquidated by institutions of telegraphic communications amount to some $80,000,000, and they should be repaid by the surplus derived from these institutions.

"3. A little more than $219,900,000 will be met with ways to be worked in the whole reorganization plan of the country, although a part can be met by the Ministry of Communications, the remainder being beyond the possibility of the ministry.

All these suggestions are premised on the possibility of the railways and telegraphs having full command of their property and the unimpeded opportunity to collect its revenue. This is just about next to impossible at the moment of writing.

Many suggestions have been made for the improvement of China's railways. One is the internationalization of control—an idea which we have opposed as being impractical and offensive to the Chinese people. Another, is a huge loan by the consortium to set the railways straight and to start them off again on a business basis. Whatever plans are adopted, depends largely upon the willingness of China's military men to envisage the situation of China, to realize that in destroying the rolling stock and equipment of the roads, they are sacrificing the interest of foreign financiers in the railways of China, which is a serious matter to a country which has to have foreign capital for the development of the country.

If the militarists in China would only let the railways alone, the Ministry of Communications could effectively handle the proposition. There are a fine lot of young men in this ministry, most of them educated in the United States, trained in railroad engineering and competent to develop a railway system. These men are of the type that Japan sent into Manchuria to build up that wonderful institution, the South Manchuria Railway. They could do good work, if only they had the chance.

Description of a Shale Oil Distillation Plant

Capacity 1,000 Tons a Day

THE shale oil distillation, which promises to revolutionize the industry of Manchuria, now being erected at the Fushun mines of the South Manchuria railway, is attracting so much attention that a description of a proposed plant proves of particular interest. The Fushun deposits are overlaid with an oil shale stratum which will be utilized commercially through the enterprize of the distillation plant. For Japan, this plant is of particular importance, as it supplements the oil-bearing properties obtained in Saghalien in the new agreement with Soviet Russia. This makes for national security and prestige and saves Japan from the necessity of purchasing such huge quantities of oil abroad.

For a plant of this capacity, four banks of vertical retorts of the continuous type, comprising 224 retorts in all, each retort being capable of distilling 4½ to 5 tons of shale per 24 hours is required. The raw shale coming from the mines will be dropped from the wagons direct into the crusher pits where it will be broken to a suitable size for the retorts and then elevated to storage bunkers from which it will be fed into the charging hatches running on top of the retort hoppers. There would be two crushers and elevators each of which would handle 50 to 60 tons of shale per hour so that 8 to 10 hours would normally be required for crushing, that is, during the day-time only. In the event of a breakdown one crusher and elevator could handle the total output by working continuously.

The crushed shale bunkers in two sets of two each would have a total storage capacity of about 350 tons and the charging platform could be so arranged between the two sets so that each set of bunkers could be used for either pair of banks of retorts.

The spent shale will be discharged continuously at the bottom of the retorts by automatic discharging gear into a receiving hopper from which it will be periodically dropped into trucks running on rails underneath whence it would be taken to the cement works.

Condensers

The gas from each battery of retorts can be collected in steel mains and led to the condensers. These consist of steel tubular coolers in which the gas receives a preliminary cooling by water, the resultant hot water being used for boiler feed. After the tubular coolers the gas passes into four batteries of atmospheric condensers consisting of a series of vertical c.i. pipes and U bends.

The condensed oil from each battery of condensers flows through a separator in which the crude oil is decanted from the ammonia liquor and the two products led to their respective storage tanks.

Exhausters

From the condensers the cooled gas passes to the exhauster house. There are three exhauster sets, one of which is in reserve. These provide the necessary suction on the retorts and propel the gas through the remaining apparatus. They are of the rotary type, direct coupled to steam engines and provided with hydraulic regulators to maintain a steady vacuum in the foul main.

In the exhauster house are also placed the crude oil and weak ammonia liquor pumps by which the crude oil is delivered to the oil refinery and the weak liquor to the ammonia scrubbers.

The exhaust steam from the exhauster house is taken to the retorts for steaming the shale and thus increasing the yield of ammonia.

Scrubbers

Alongside the exhauster house in the open are placed the scrubbers in one set of which the gas is scrubbed with the weak liquor to remove the rest of the ammonia and to work up the liquor for distillation in the sulphate house. In the second set the gas is scrubbed with oil to recover the naptha—the pumps for circulating the oil being located in the naptha plant.

Each set of scrubbers is provided with receiving tanks for the saturated liquors from which they are sucked by the still feeding pumps in the sulphate and naptha houses respectively.

Gas Governors

The gas leaving the scrubbers is returned to the retorts for heating, first passing through a governor to maintain a constant pressure on the return gas main and to give uniform heating to the retorts. It is assumed that there will be sufficient gas produced for heating the retorts and no auxiliary heat producers (coal or wood) are required.

On the inlet to the governor is placed a surplus gas regulator which acts as a relief valve and allows any excess of gas over that required for heating to pass off. This gas (if any) could be utilized for lighting or heating in other parts of the plant.

Naptha Plant

In the naptha plant the saturated oil from the scrubbers and the naptha fractionated out from the oil refinery will be handled. Tanks are provided for fresh washing oil, stripped oil and saturated oil, with the necessary pumps for feeding the stills and scrubbers and decanting and manipulating the wash oil. For this last purpose an auxiliary oil tank is provided fitted with steam heaters and run from taps at various levels.

There are two sets of distilling apparatus in which the crude naptha will be distilled from the wash oil. The crude naptha is condensed, passed through a separator to remove water, then into a daily production or measuring tank and finally pumped up to storage tanks placed at a suitable level for feeding the refining stills.

The stripped wash oil flowing from the crude stills is cooled by means of a gilled pipe cooler built in serpentine form under a water cascade, and flows to the stripped oil tank, from which it is again circulated over the scrubbers.

The crude naptha obtained is now washed with sulphuric acid and soda in a lead-lined agitating vessel, the tars run off and the washed spirit deposited in a receiving tank from which it is blown into the first refining still. This still is of the usual type provided with fractionating columns, analyser and condensers and furnishes the first fractionating of the spirit. It may, however, be more convenient in working, to distil the crude naphta without washing and to wash separately the fractions obtained from the first distillation. This will depend on the nature of the naptha.

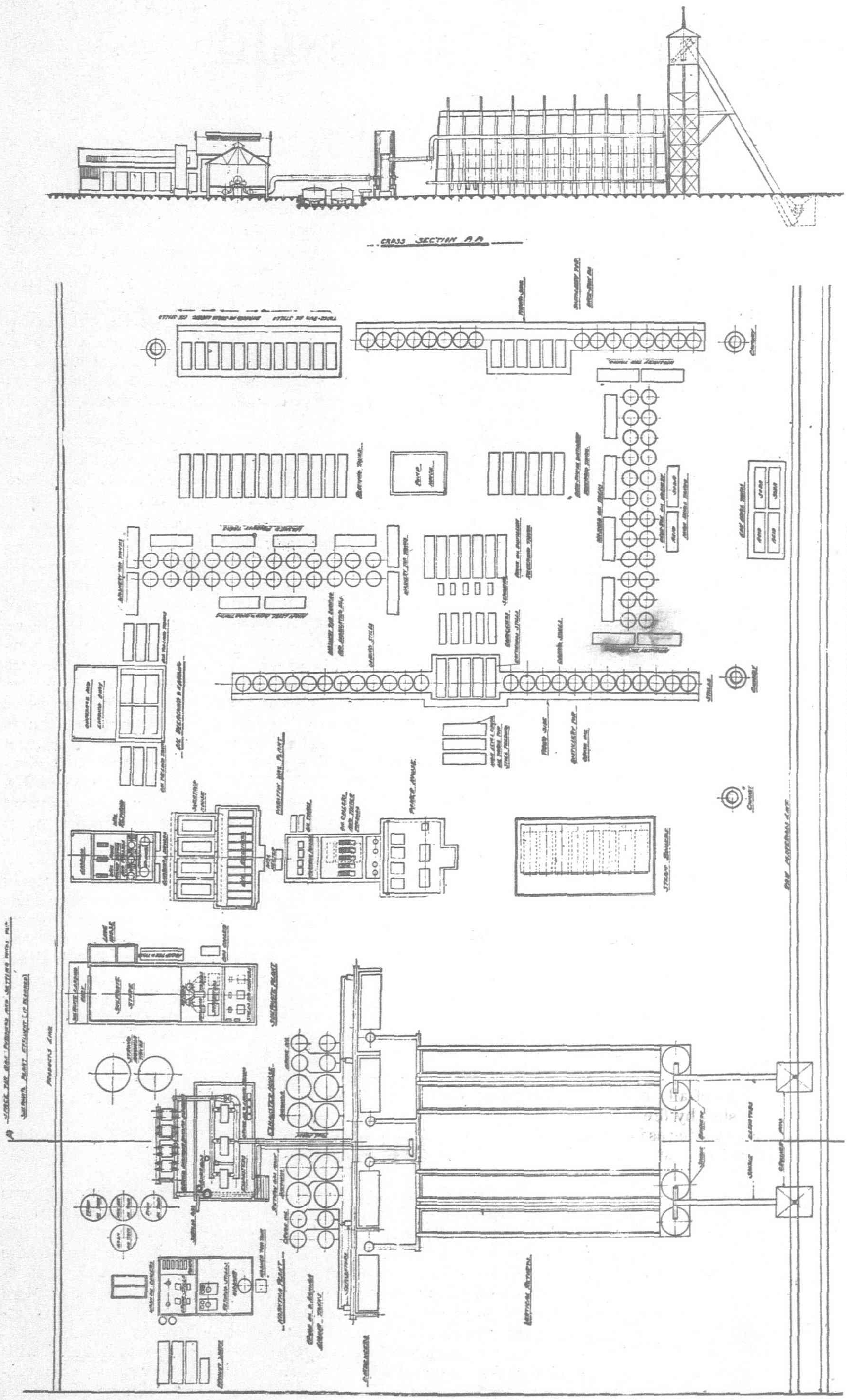
The fractions from the first distillation are then re-distilled in a second refining still similar to the first and the resulting spirit and heavier naptha taken to storage and loading tanks. The still residues return to the wash oil tank.

Sulphate Factory

In the sulphate house will be placed the necessary continuous stills for distilling the ammonia liquor coming from the scrubbers. The liquor is first of all pumped up to a small overhead feed tank to give a uniform flow of liquor. The liquor is preheated on its way to the still by heat from the hot gases given off in the saturators. The stills will be provided with liming sections and a set of lime mixing apparatus will be provided. The ammonia vapors coming from the stills will be led through iron pipes to the saturators.

The saturators will be constructed of heavy chemical lead with timber framing and will be provided with cracker pipes, acid catchers, and copper salt ejectors. The sulphate will be discharged on to lead-lined draining tables from which it will fall to the centrifugal dryers and from thence conveyed to the sulphate store for bagging and shipment.

The waste gases from the saturators will pass, after the acid catchers, into the liquor heaters where they will receive a preliminary cooling and then into a serpentine cooler under a cascade



PROPOSED SHALE DISTILLATION PLANT

of water. Before discharging into the atmosphere they are purified by passing through oxide or lime purifiers built in brick or concrete.

The spent liquor from the stills is settled in brick ponds, if necessary, before discharging to waste.

An acid feed tank is fixed alongside the sulphate house at a suitable level for feeding the saturator by gravity, the acid being blown into the feed tank from the acid receiving tanks near the railway.

Oil Refinery

The 250 tons of crude oil per day will be collected in the cruds oil tanks connected to the condensers. By means of the pumps in the exhauster house it will be pumped up to receiving tanks in the oil distillery; these receiving tanks being fixed at a suitable height for feeding the crude oil stills by gravity.

The first portion of the process consists in the preliminary fractionating of the crude oil into the naptha, once-run green oil and coke. This is accomplished in a battery of five continuous boiler stills in a brick setting and provided with the necessary steaming arrangement, condensers, heaters, separators and receiving tanks. The residue from the continuous stills then passes into a battery of coking stills where it is distilled to dryness. The coking stills are provided with condensers and gas take-offs and connections to the receiving tanks. The naptha fraction is delivered along with similar fractions from subsequent distillation, to the naptha plant.

The "once-run green oil" fraction from the above process is washed prior to further distillation. For the washing of this and subsequent fractions a battery of oil washers is provided consisting of two lines of washers, one for acid washing and the other for soda washing. These washers are steel tanks with covers and conical bottoms and fitted with compressed air agitators. They are elevated on brick walls so that the oil flows by gravity from the acid washer to the soda washer and from the soda washer to the washed oil receivers. From the receivers it is blown by compressed air to the stills. The unwashed oil is delivered to the washers from the still receiving tanks by pump or compressed air. Feed tanks, acid, soda and receiving tanks for the resultant tars are provided.

After washing, the once-run oil is distilled in a battery of six boiler stills also provided with a series of coking stills and from this distillation is obtained, light oil, heavy burning oil (called twice-run oil), green oil and coke.

The "twice-run oil" from the above distillation is then washed

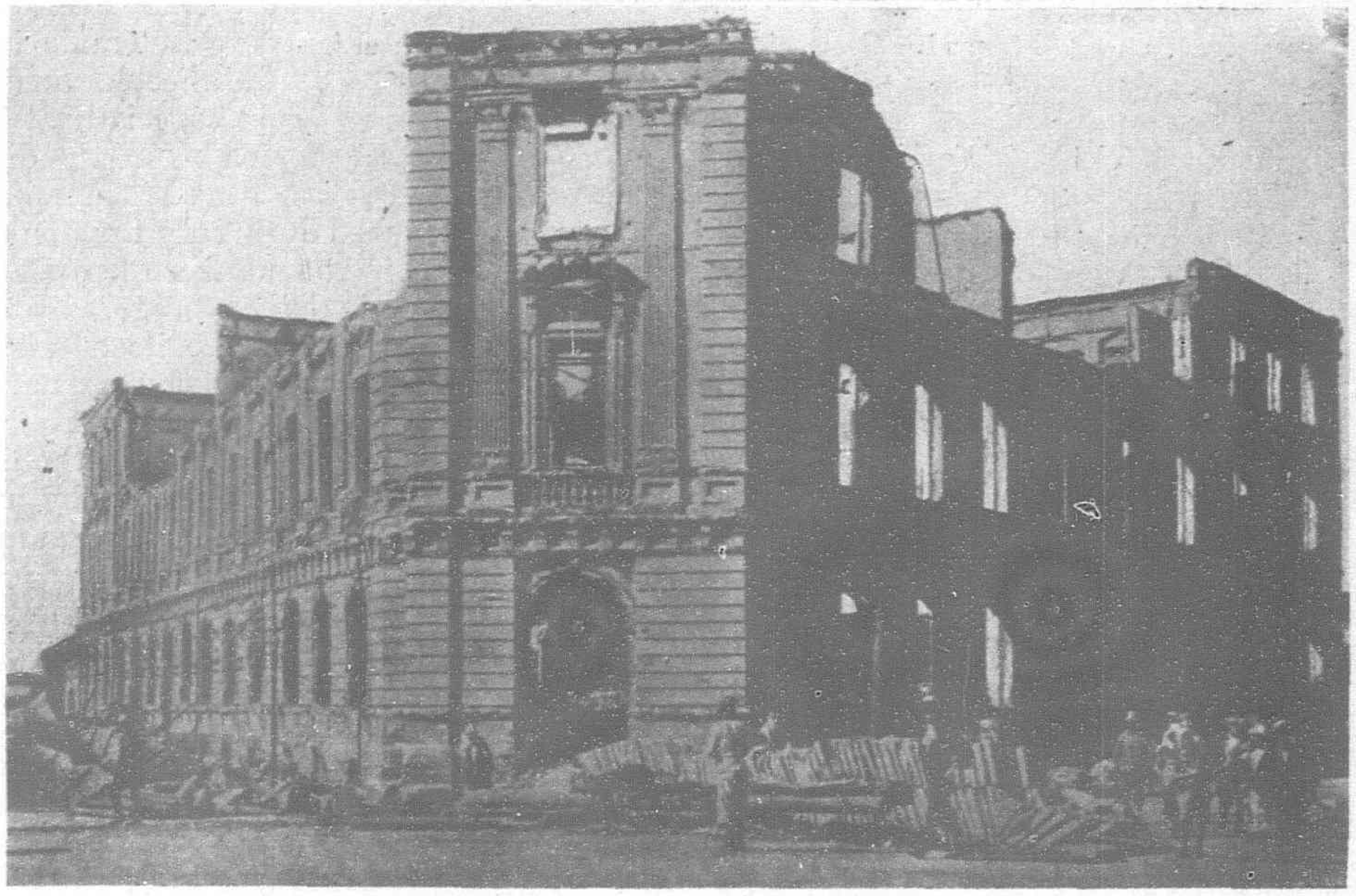
(Continued on page 144).

Earthquake Damages Telegraph and Telephone Installations of Japan

By SANNOSUKE INADA

Chief Engineer of Technical Section, Department of Communications, Japan

THE Tokyo earthquake caused severe damage to the telegraph and telephone installations in Tokyo, Yokohama and their vicinities ; and a majority of the office buildings, equipments, and line plants in these localities was reduced to ashes by the conflagrations which spread immediately after the quake. Damages to these installations were so serious that they can never be fully stated in detail, but it is intended that general descriptions concerning them shall be given.



General View of Tokyo Central Telegraph Office after Fire

Damages to Installations

The number of the first and second class offices damaged is given below :

District	No. of Offices	Burnt or Wrecked
Tokio and its suburbs	23	13
Province of Kanagawa	8	7

The line plants connecting and terminating at the above offices were wiped out by conflagrations. The damages to the Tokyo central telegraph office caused not only an interruption of the entire central service of telegraphic function in Japan, but also of her international communications.

As soon as the quake occurred the 350 telegraph circuits, which terminate at the Tokyo central telegraph office, came to faults of contacts and earth ; and the electrical source for the telegraph was shut down by the tumbling down of the secondary batteries. Thus all the circuits were interrupted, and at the same time all employees, rushing outdoors, barely escaped being crushed by the destruction of walls on third floor. As this building was very old, a new central office in the centre of the city was in course of construction, reinforced concrete being used throughout. In spite of all efforts of the employees, all installations were reduced to ashes by fire on the evening of the first day ; the principal equipments lost being as follows:

Equipment	*Number Lost*
Wheatstone automatic transmitter and receiver	126
Quadruplex and simultaneous A.C. and D.C. duplex	Sets for 19 Ccts. and spare
Duplex and combined Dx-Sx.	Sets for 65 Ccts. and spare
Simplex	Sets for 138 Ccts. and spare
Syphon recorder duplex (for Bonin and Guam cable)	1 complete set
High frequency simplex	1 complete set
Western electric quadruple-duplex printer	1 complete set
Western electric start-stop printer	1 complete set
Teletype	2 sets
Kleinschmidt keyboard perforator	17 sets
Telegraph switchboard	2 sets
Monitoring set	5 sets
Pneumatic tube equipment	14 sets
Ticker	126 sets
Testing equipment	Complete set

The underground cable between Tokyo and Yokohama was burnt or crushed in Yokohama and near the river Rokugo, and totally damaged near the river Banyu, where the cables were suspended by arms attached to the piers of the railway bridge.

Disaster in the vicinity of Hakone was so serious that no pole line remained on account of the cracks and failures in the ground. One may easily gage the magnitude of the disaster by referring to Figure 1, which shows the damage done to a pole line in Yokohama.

As a result of the first quake, the Guam cable, the only cable which connects Japan with the United States of America, went down to fault and was interrupted. For urgent repairs the *Okinawa Maru* was ordered to steam hastily from Nagasaki, and after strenuous endeavors, co-operating with two other cable ships, *Ogasawara Maru* and *Nanyo Maru*, faults were cleared on October 27. The latter cable ship, being then anchored at Yokohama, supplied cables and other materials needed for the repair to the *Okinawa Maru*, and the former made hasty trips to supply the necessary cables, carrying them from the cable tank at Nagasaki. The faults of this cable were grappled at 16 points along the route, at distances from 44 to 75 knots from Etchujima cable house, where this cable is landed, operating both inside and outside of Tokyo bay at depths of sea measuring from 300 to 1,160 fathoms. Locations of these faults were as follows :

Fault	*Distance Along Cable from Etchujima*
Point No. 1.	About 44.5 knots (About 5 knots off Kachiyama, westward)
Point No. 2.	About 45.5 knots
Point No. 3.	About 46.1 knots
Point No. 4.	About 46.6 knots
Point No. 5.	About 66.6 knots
Point No. 6.	About 74.1 knots (About 10 knots off Habu harbor in Oshima, westward)

According to investigations, it seems that these faults were due to sudden shocks which were caused by the earthquake. The faults were breaks and grounding, and from an inspection of the faulty parts of this cable it was noted that it was broken with no elongation of armor steel but as if a tremendous stress had been applied suddenly. By the fact that at some points the cable seems entangled forcibly, it can be imagined that these faults might have occurred at points where some part of the cable was buried under the sea bed according to its sudden change.

It may be added, in passing, that the condition of damage on the Sakurajima submarine cable, which connected Kagoshima and Sakurajima island, and which was affected by the eruption of Sakurajima island of January 1914, was nearly the same as that of the Guam cable above mentioned. At one or two feet from the end of the cable break, the inner serving of the former cable was snapped at quite numerous points.

The underground portion of the Guam cable from cable house to Tokyo central telegraph office, which is of four cores of I.R. cables was also burnt at several bridges on its route, but was repaired before communication between Tokyo and Guam was restored.

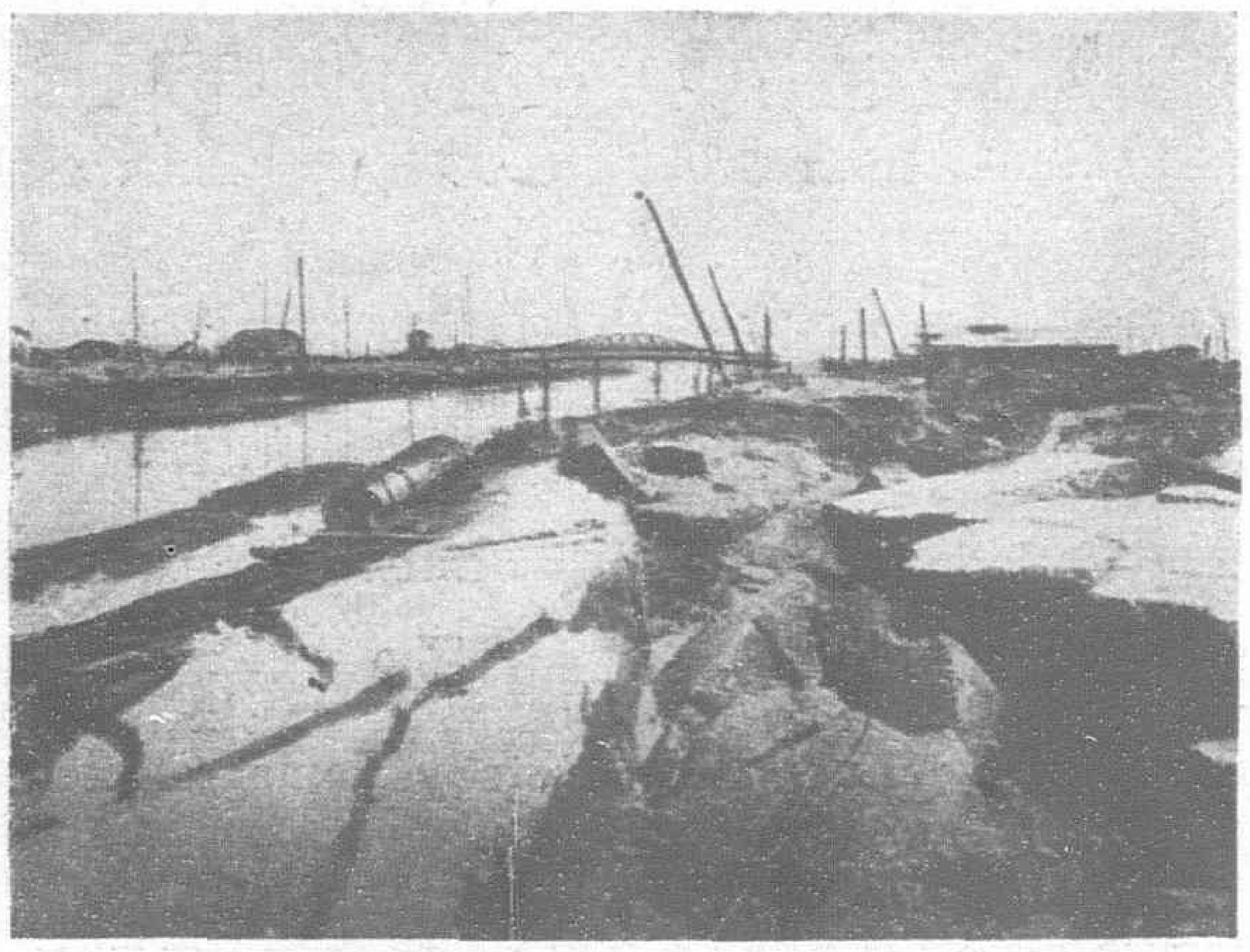


Figure 1.—Cracks in Ground Near a River in Yokohama. Telephone Pole Near Centre of Picture

Emergency Measures

As a consequence of the entire breakdown of the Tokyo central telegraph office system, it was planned on the afternoon of the very day of the disaster to open a temporary telegraph office in the building of the communication officers training institution in Shiba park, but that plan fell through completely, as the building was burnt in the early morning of the second day. Thereupon it was decided, first of all, to connect Tokio with other important cities at some point in the suburbs of Tokyo. For this purpose Senju office, which is situated in a part north-east of Tokyo, was chosen from the standpoint of routing. Communication concerning relief business was successfully opened with Osaka, Nagoya and Sendai at 11 p.m. on the second day. As shown by the map (Figure 3) the central and the busiest portion, or nearly one-half of the area of the city of Tokyo was burnt; it was a very difficult task to find an appropriate site for the central office.

For convenience sake it was planned to open the temporary central telegraph office in the building of Tokyo central post office, which fortunately escaped the fire. After much effort instruments and materials were gathered from all districts. On the other hand, by jointing together underground cables of telegraph and telephone, which remained undamaged in the city, it was possible to open communication from centre of the capital to the cities of Osaka, Nagoya, Nagasaki, Kobe, Sapporo and Nagano; one after another in the period from the fifth to eighth day. At the same time a temporary circuit between the central office and the radio station in the telegraph corps at Nakano, a suburb of Tokyo, which served to connect other radio stations and the central office, was constructed by a force from the telegraph corps.

On the 14th the temporary Tokyo central telegraph office was removed to the fourth floor of Eiraku building, where emergency circuits terminating at Senju, Kameido and other places were cut over together. Thus the organization of the plant of the Tokyo central telegraph office was consolidated, which had been rather disorganized since the day of the the disaster. Later, the number of circuits which terminated at this office were gradually increased, making a total of 65 on November 11, and they afforded efficient service to all quarters of Japan.

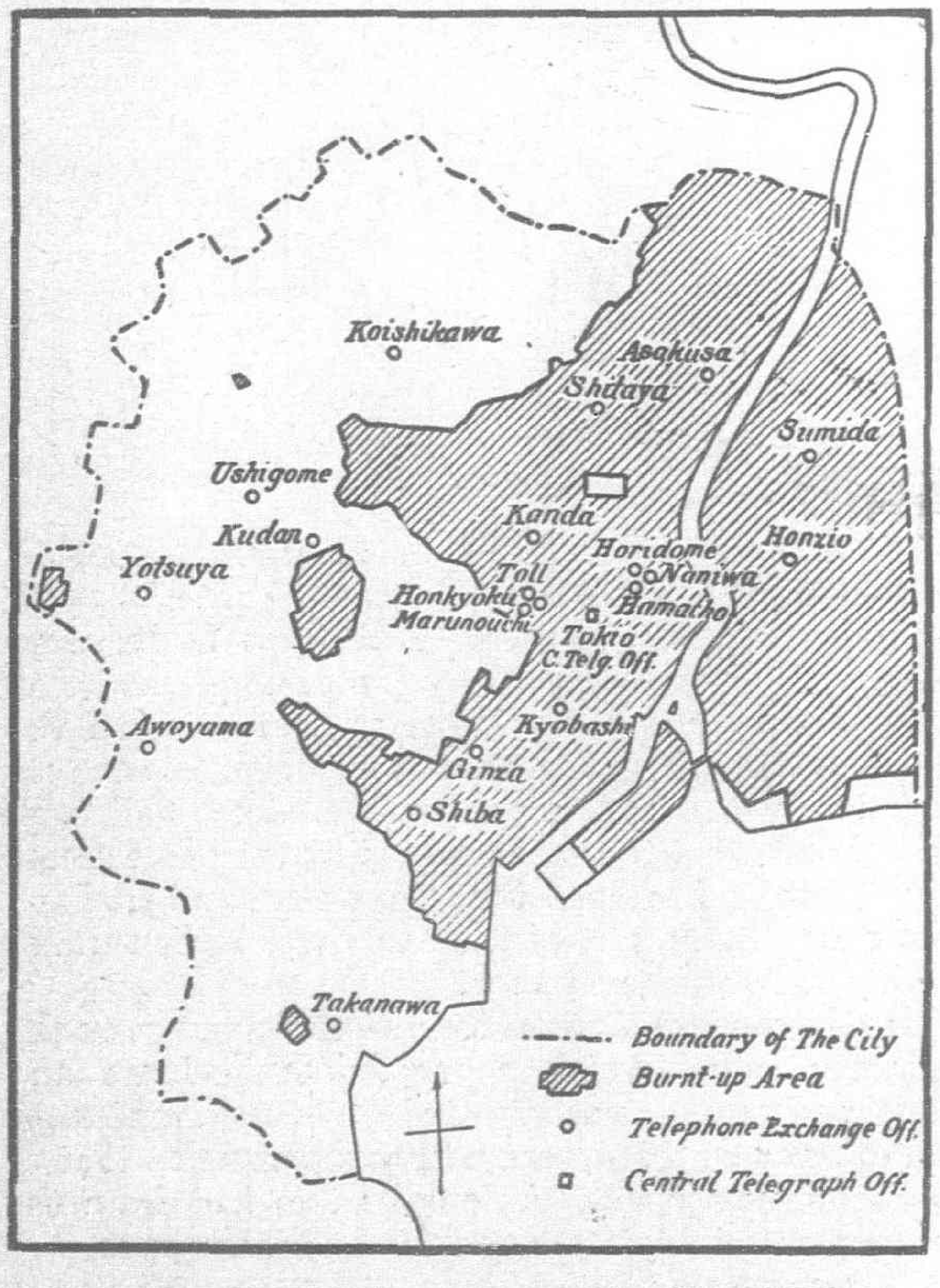


Figure 3.—Map of Burnt Area in the City of Tokyo

At Yokohama, as the damages done to that city were so serious that many of our employees were killed and injured, any sort of planning of emergency measures was very difficult. As nothing could be done in the centre of the city a temporary office was established at Kanagawa station of the interurban electric railway between Tokyo and Yokohama. On September 12, a telegraph service was offered to the public but with some restrictions, serving relief messages only as in Tokyo. Communication from Yokohama to Kamakura and Yokosuka was commenced on the 17th. On October 24, after removal of the temporary office to the barracks at Sakuragicho, communication with Osaka, Shizuoka, Maebashi, Kyoto, Sannomiya and other places was re-opened.

Traffic in the districts outside the affected area increased extraordinarily, especially at Osaka where it came up to over twice the daily service before the disaster, amounting to something over 188,000 messages on September 5. At Sannomiya foreign messages dispatched during the first ten days of September increased by 80 per cent. in the number of messages and 250 per cent. in the number of words in daily average. As temporary measures for this extraordinary condition circuits as direct as possible from Tokyo to the cities in Chugoku, Kyushu and north-east districts were chosen making use of circuits which were interrupted. Although unexpected, owing to the makeup of the temporary circuits involved, satisfactory results were obtained by putting the duplex Western Electric type printer in use for foreign messages between Osaka and Nagasaki.

Damages to the Telephone

I. Damages to the Office Buildings

Number of centrals and the extent of damages sustained from the earthquake calamity are given in a table elsewhere in this article.

In Yokohama the central Honkyoku was, as shown in Figure 5, wrecked entirely and many employees were killed or injured there. In Tokyo, the central Kyobashi was, as shown in Figure 6, destroyed at its corner and several employees, here also, were killed or injured, the building afterwards burning to ashes. The centrals Shiba, Kanda, Naniwa, Shitaya and Honkyoku, being of brick construction, were damaged seriously and burnt to ashes afterwards. The central Kudan was damaged so seriously that it cannot be used again, owing to the cracks in the walls or unrepairable damages to the main structures. As for the remaining centrals such as Sumida, Ginza, Hamacho, Horidome and Asakusa, damages were comparatively slight and these might be used again by simple repairs. By the conflagrations which spread immediately after the quake all these centrals lost all the equipments, furniture, etc., the main structures of reinforced concrete alone being saved.

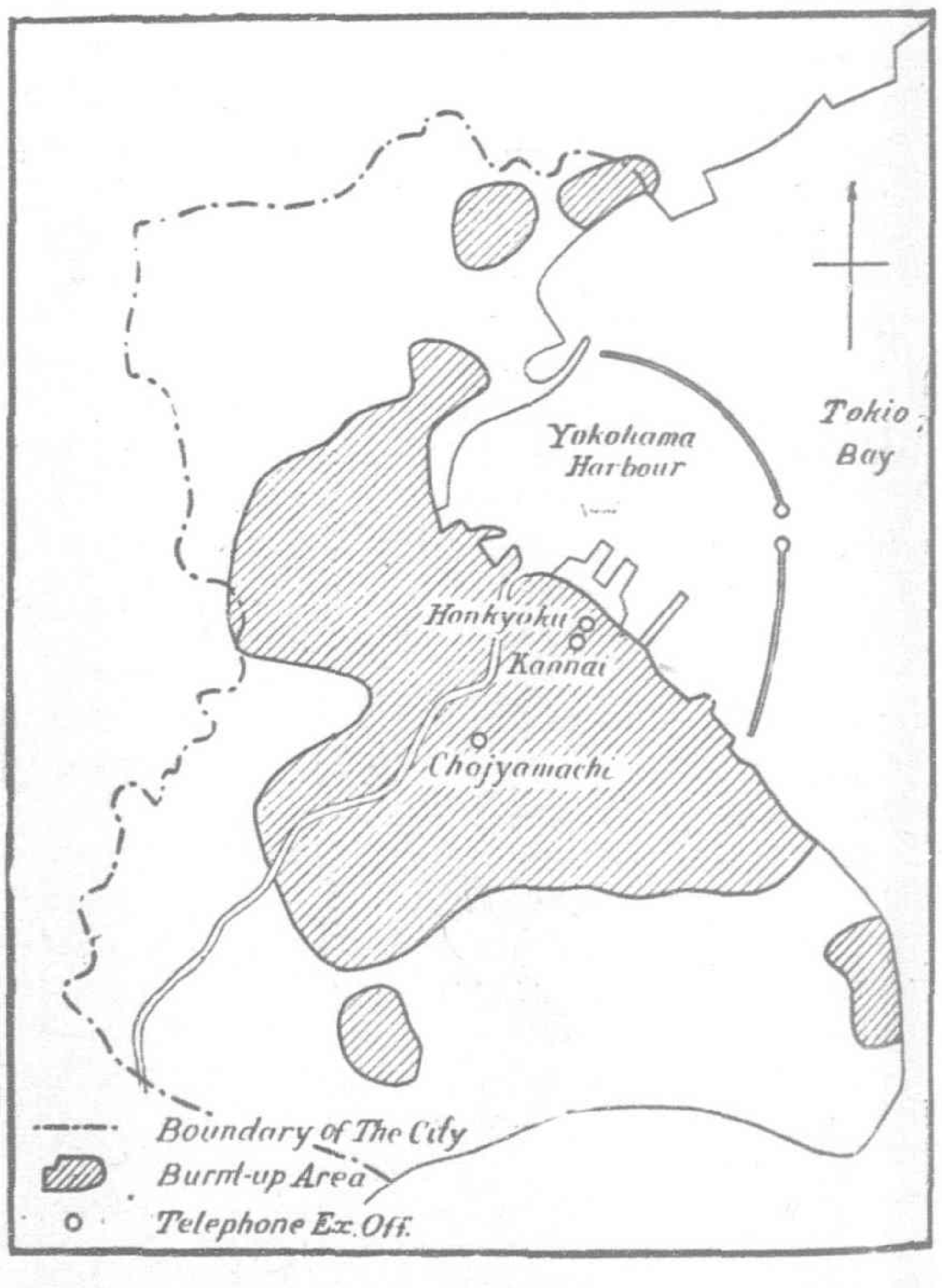


Figure 4.—Map of Burnt Area in the City of Yokohama

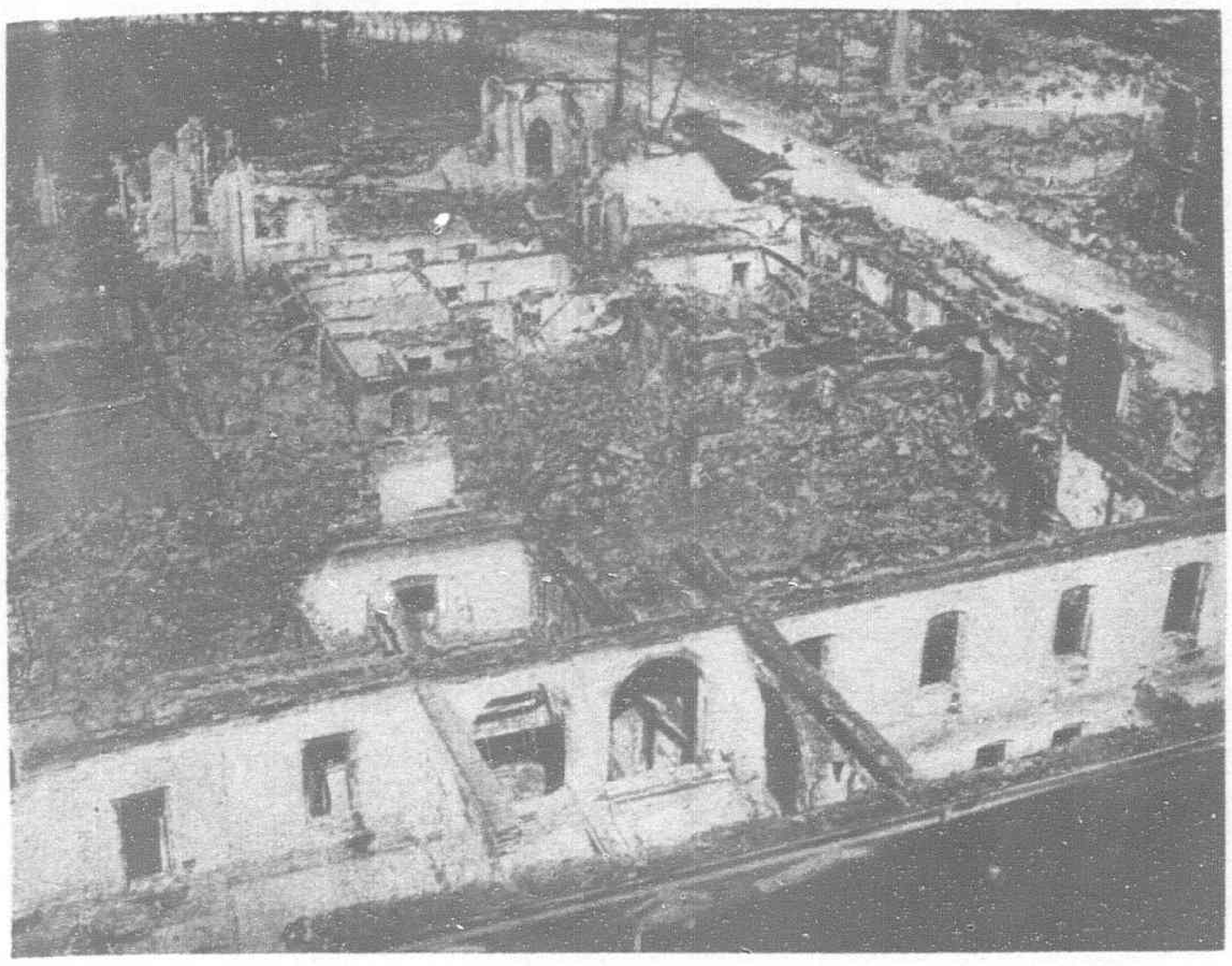


Figure 5.—General View of Ruins of Telephone Central Honkyoku, Yokohama

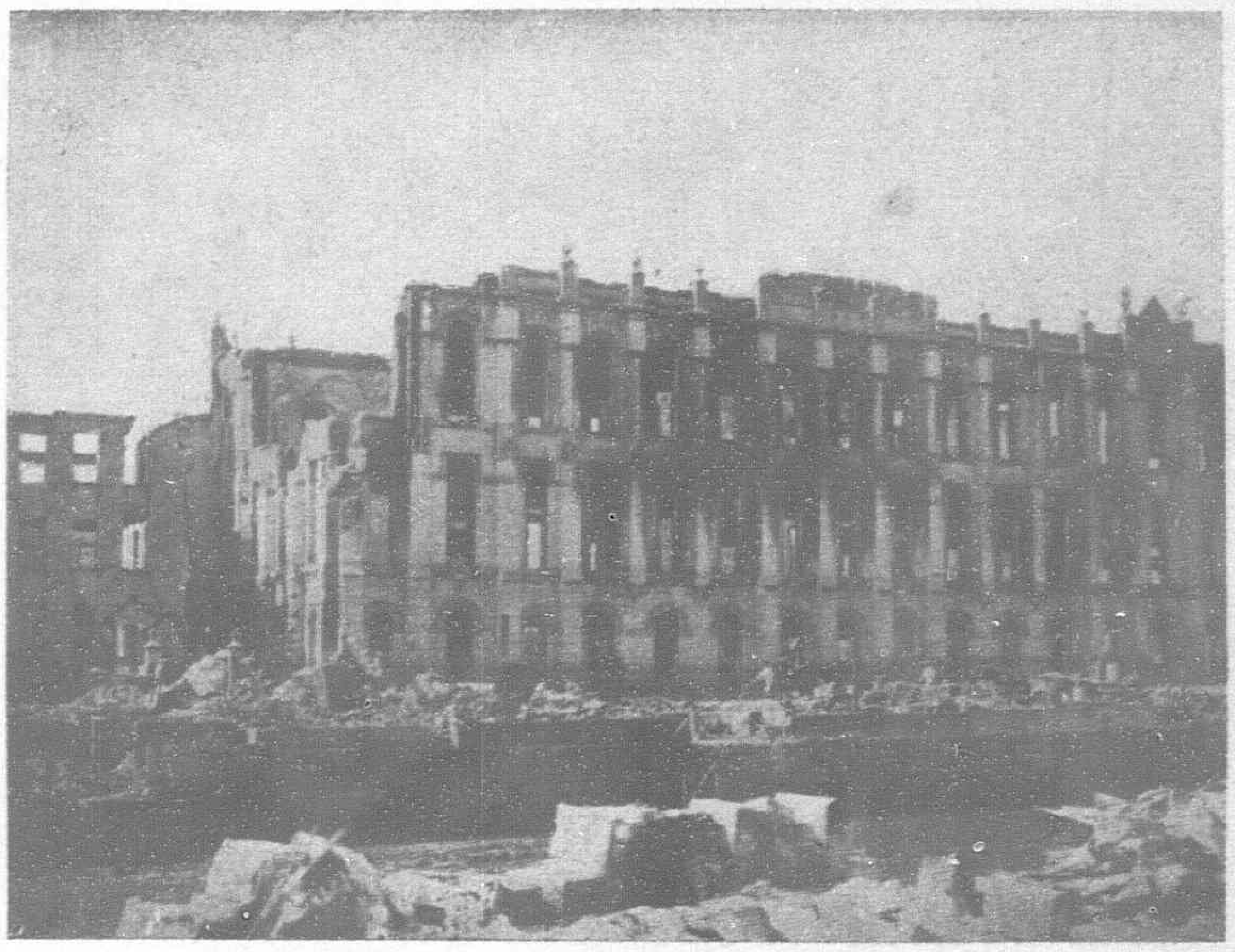


Figure 6.—Outside View of Telephone Central, Kyobashi, Tokyo, After Fire

City	*Extent of Damage*	*Number of Offices*	*Type of Building Construction*	
Tokio	Damaged beyond repair	8	Stone work Reinforced concrete	1 7
	Structure only saved—equipments, furniture, fittings, etc., burnt—available by repair and re-equipment	7	Reinforced concrete	
	Available by reinforcing, though seriously damaged — equipments not burnt	1	Reinforced concrete	
	Available by repairing—equipments not burnt	4	Reinforced concrete	
Yokohama	Wrecked almost completely and burnt	1	Brick work	
	Structure only saved—equipments, furniture, fittings, etc., burnt—available by repairing	1	Reinforced concrete	
	Available by repairing—structure only saved	1	Reinforced concrete	

Thus all the centrals in Yokohama were shut down. In Tokyo two centrals, Kudan and Yotsuya, were not burnt, but became unavailable; 14 of them burnt completely with their equipments; and only four remaining were capable of being opened to renew their service, namely Koishikawa, Ushigome, Awoyama and Takanawa.

II. Damages to Office Equipments.

At the instant of the severe shock, some of the switchboards rocked backwards and forwards, cable runways dropped, M.D.F. and I.D.F. deformed in a corrugated way becoming wavy, relay racks inclined, and meter batteries tumbled down. While these damaged parts were being investigated and restored as soon as possible in order to resume the service the fires started at nearly every part of the city, and spread out at a tremendous rate. While it was impossible at the time to investigate fully the extent of damages done to the equipments in each office, the six surviving centrals were investigated more fully. It should be remembered that the extent of the damage was different in each case, some so slight as loosened bolts, disorder of relay adjustment and running over of electrolyte of storage batteries. These slight damages were present even in the cases denoted as "right" in table on following page showing the condition of damages in six surviving centrals.

A description is given here of the condition of the batteries, which is applicable to all the centrals, and which is of interest in connection with improvement of setting in telephone offices. Damages to other kinds of equipment will be described later.

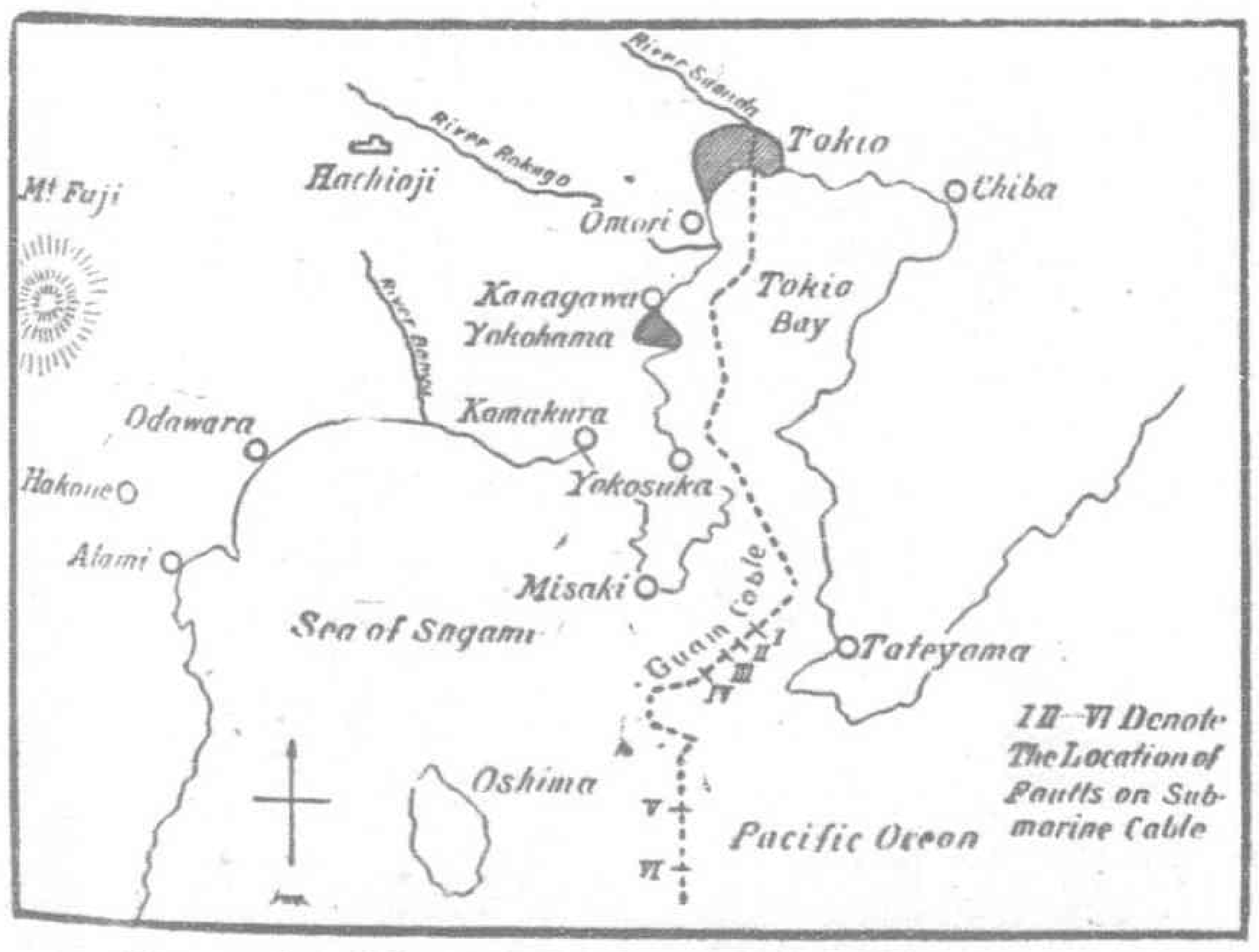


Figure 2.—Map of the Severe Quake Area on September 1, 1923

Electrolyte in cells ran over more or less in all the centrals. The glass type cells for register use (40v) were arranged on two wooden frame shelves, upper and lower, and some of the cells on upper shelf fell down and were broken.

None of the cells of the common battery (24v), which were in lead-lined wooden tanks, tumbled as they were set on the floor and were, therefore, stable. Among damages done to the common batteries in the centrals, Yotsuya, Ushigome and Awoyama, the following may be mentioned. Ears of the active plates were melted as a consequence of short circuit, due to breaking of the supporting side glasses, although they were of a standard size of secondary cell maker. In the case of two cells in Awoyama buckling of plates, which was occasioned by the falling of active materials, caused short circuit of the plates, thereby introducing a small hole in the lining of the tank, which led to running out of electrolyte. This hole, so small as not to be visible, seems to have been caused by sparks at a point where the active materials made a partial contact with the lead-lining. While the above batteries were of the G.S. type made in Japan, those in the centrals Takanawa and Koishikawa were of the Tudor type, and in the latter case there happened no such damage as mentioned above. The difference in the condition of both instances above cited is probably due to the difference in the thickness of the supporting side glasses.

The generating equipments in all centrals were undamaged owing to the good foundations, especially so was this the case in Sumida central. As fire was not so serious there, 10 among 11 cells of common battery of that office

Figure 9.—Ruins of M. D. F. and Office Manhole After Fire in Telephone Central, Ginza, Tokyo

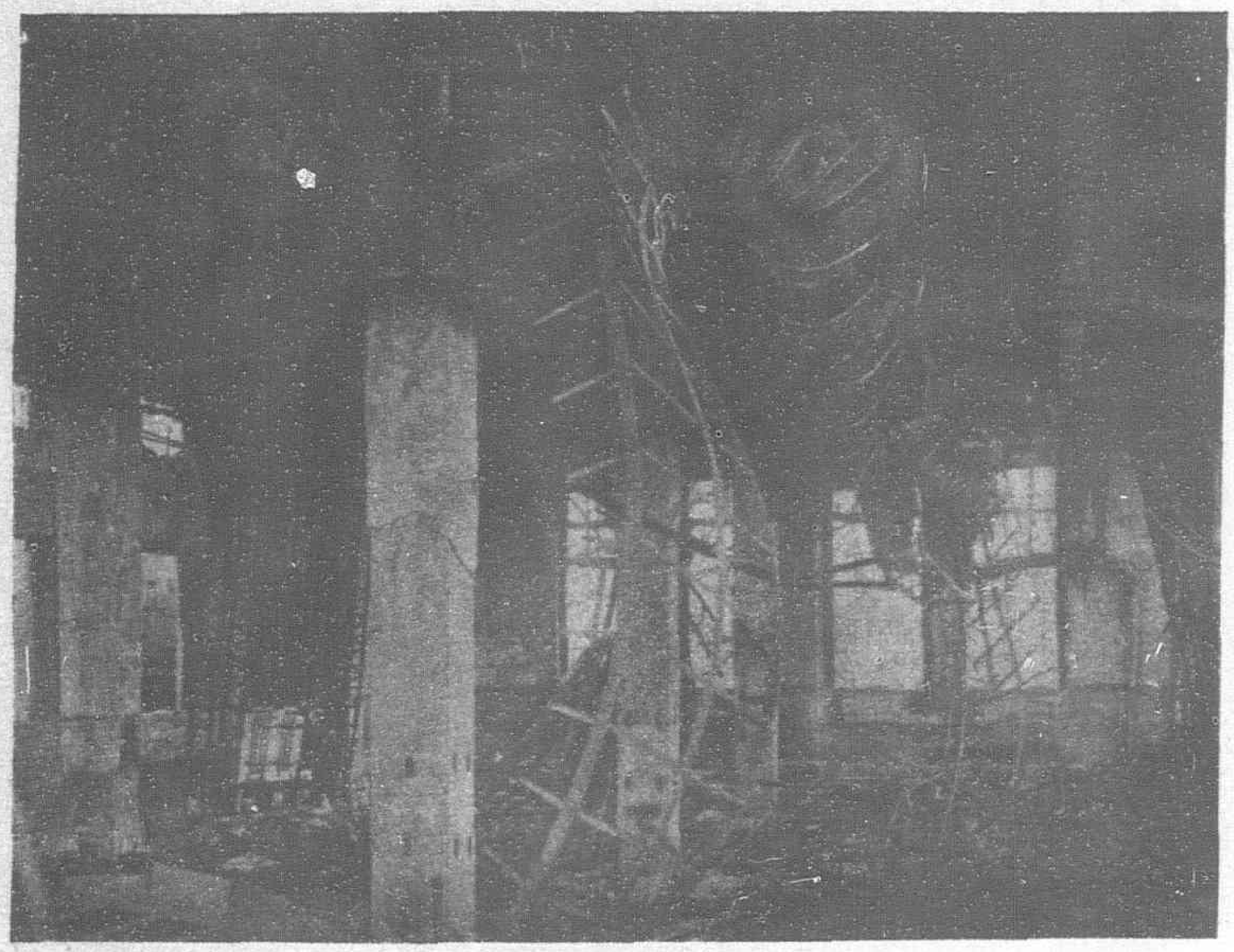


Figure 7.—Ruins of Cable Room after Fire in Telephone Central, Horidome, Tokyo

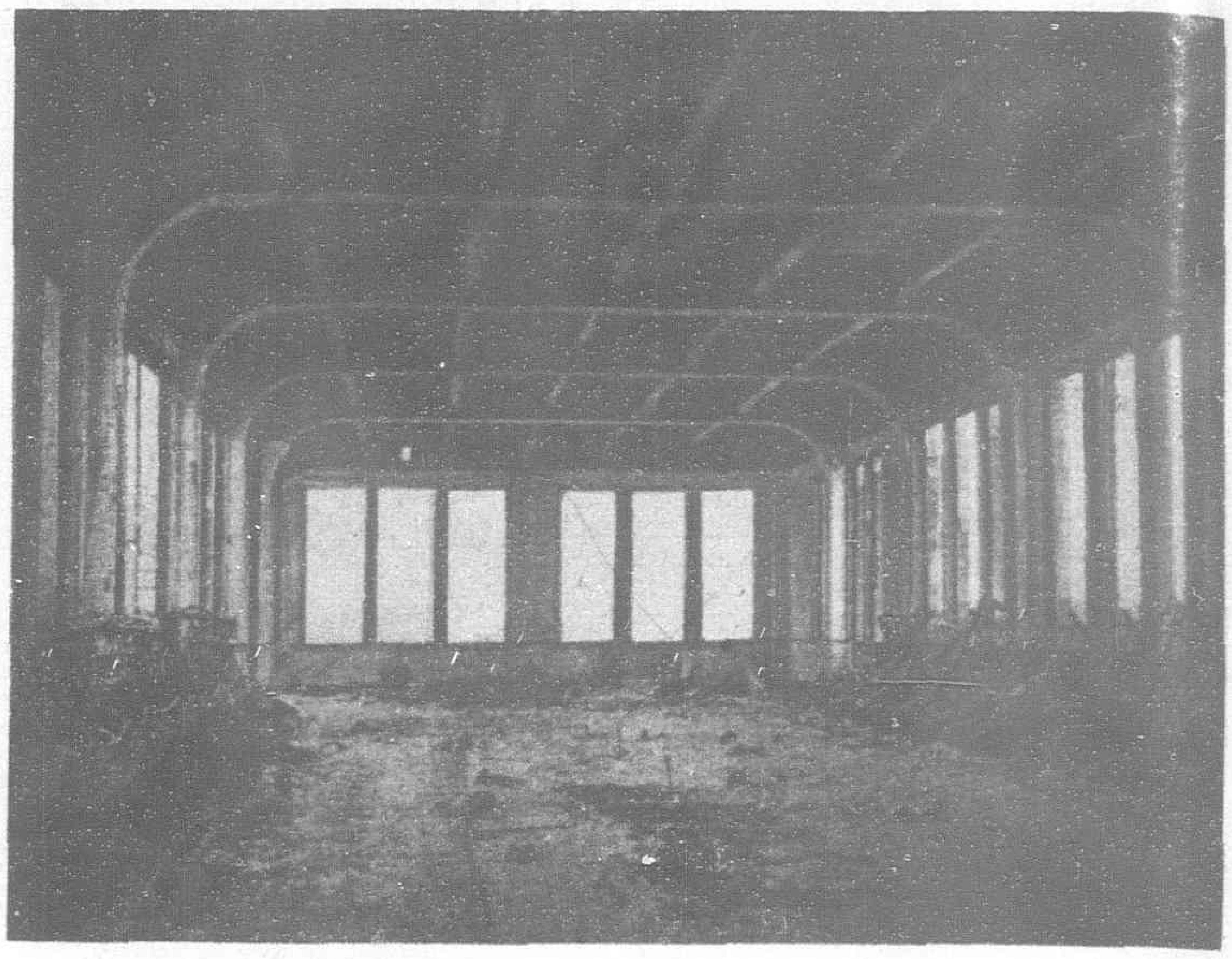


Figure 8—Ruins of Switching Room after Fire in Telephone Central, Hamacho, Tokyo

were utilized again in another central by replacing some of the plates.

III. Damages to the Subscribers' Stations and Line Plants.

TOKIO

Facilities	*Number Before Disaster*	*Burnt or Demolished*	*% Damaged*
Subscribers' stations	82,766	50,265	60.8
Poles	58,521	26,598	45.0
Arms	198,622	82,251	41.0
Aerial cable (cable length)	28,543 miles	12,299 miles	43.0
Pot heads	4,897	2,927	60.0

YOKOHAMA

Facilities	*Number Before Disaster*	*Burnt or Demolished*	*% Damaged*
Subscribers' stations	10,340	9,740	94.0
Poles	13,350	12,600	90.0
Arms	24,700	21,600	88.0
Aerial cable (cable length)	104 miles	75 miles	72.0

The preceding tables show numerically the damages done to the subscribers' stations and line plants in both Tokyo and Yokohama.

In both of the cities Tokyo and Yokohama, most of the manholes were so deluged that it prevented a full inspection of damages done to the underground cables, but the following table gives the figures for cables which were penetrated by water through damages to the lead sheaths in the Tokyo area.

Cable	*Cable Length Unavailable In Miles*	*Cable Length Before Disaster In Miles*
1,200 pr.	.33	1.00
800 ,,	.05	.09
600 ,,	17.30	52.00
400 ,,	50.00	150.00
200 ,,	101.00	302.00
100 ,,	24.00	120.00

As the result of inspection of cables, the following faults on the cables terminating in five centrals were found :—

Cable	*Total No. of Ccts. Prepared for Subcs.*	*No. of Und. Gr. Cables Terminated*	*No. of Faults Location on Und. Gr. Cable*	*Ny. of Faults Location on Aerial Cable*
Koishikawa	9,000	27	0	50 pr.—15
Ushigome	7,400	12	200 pr.—1 400 pr.—1	50 pr.— 7
Awoyama	4,800	11	0	0
Takanawa	6,200	18	400 pr.—1	50 pr.— 8
Yotsuya	3,600	6	600 pr.—1	0

As the description has been of a general character heretofore, a more detailed summary will be given below :

Toll Lines : Among the damages done to the toll lines, it may be mentioned that the underground toll cable between Tokyo and Yokohama was so seriously damaged that it can hardly be repaired. This cable was installed in 1922 by the latest practice of engineering method. It is of the quadded type, medium heavy loaded, and was manufactured by the Western Electric Company in the United States of America, minute care being taken to minimize capacity unbalances not only between conductors of the pairs but also between pair and pair. On its installation, cores were chosen and spliced, so as to minimize the capacity unbalances between each circuit, at seven points in each loading section. While this cable was installed with such extreme caution as above stated, it sustained from disaster such damages as the crushing of the cast iron conduit, sinking and shifting at the river Rokugo and other places along the route. Such painstaking labors during the cable laying was of no account, and a more minute investigation and electrical measurements will be necessary before it will again be available for the restoration of the service. The balancing at those faulty points will be more difficult than in the case of initial installation, because sufficient points cannot be obtained to make the balance.

Kind of Damage	*Amount Damaged Miles*	*Remark*
Cable length burnt	2.5	Total cable length before disaster was 42 miles.
No. of points of punctured or break	21	
No. of cables punctured or broken	82	
No. of locations water penetrated	273	
No. of cable pieces water penetrated	420	

It is to be regretted that the scheme of replacing the present aerial toll lines between Tokio and Okayama (nearly 500 miles) by such quadded and loaded cables, with repeater stations *en route*, will have to be postponed ; as a part of this scheme, the cable working between Tokyo and Odawara was in course of construction. The cable drums had been distributed along the route, so that they sustained haevy damages ; while the loading coils were burnt completely, for they were in course of testing in Yokohama. But it is desired to perform the above scheme as soon as the financial condition of the government admits.

Cables Routed on Bridges : Figures 12 and 13 show examples of the damages done to the cables routed on public bridges in Tokyo, which were found at a point crossing the government railway where underground cables were installed in conduits laid under the road. By the destruction of the embankments at both sides all conduits at points indicated by A and B in the figure and the lower layers of conduits at point C were broken, consequently cables kept their continuity merely by cores, lead sheath being peeled off as shown in Figure 15. This is caused by the shearing force on conduits, caused by the relative displacement between

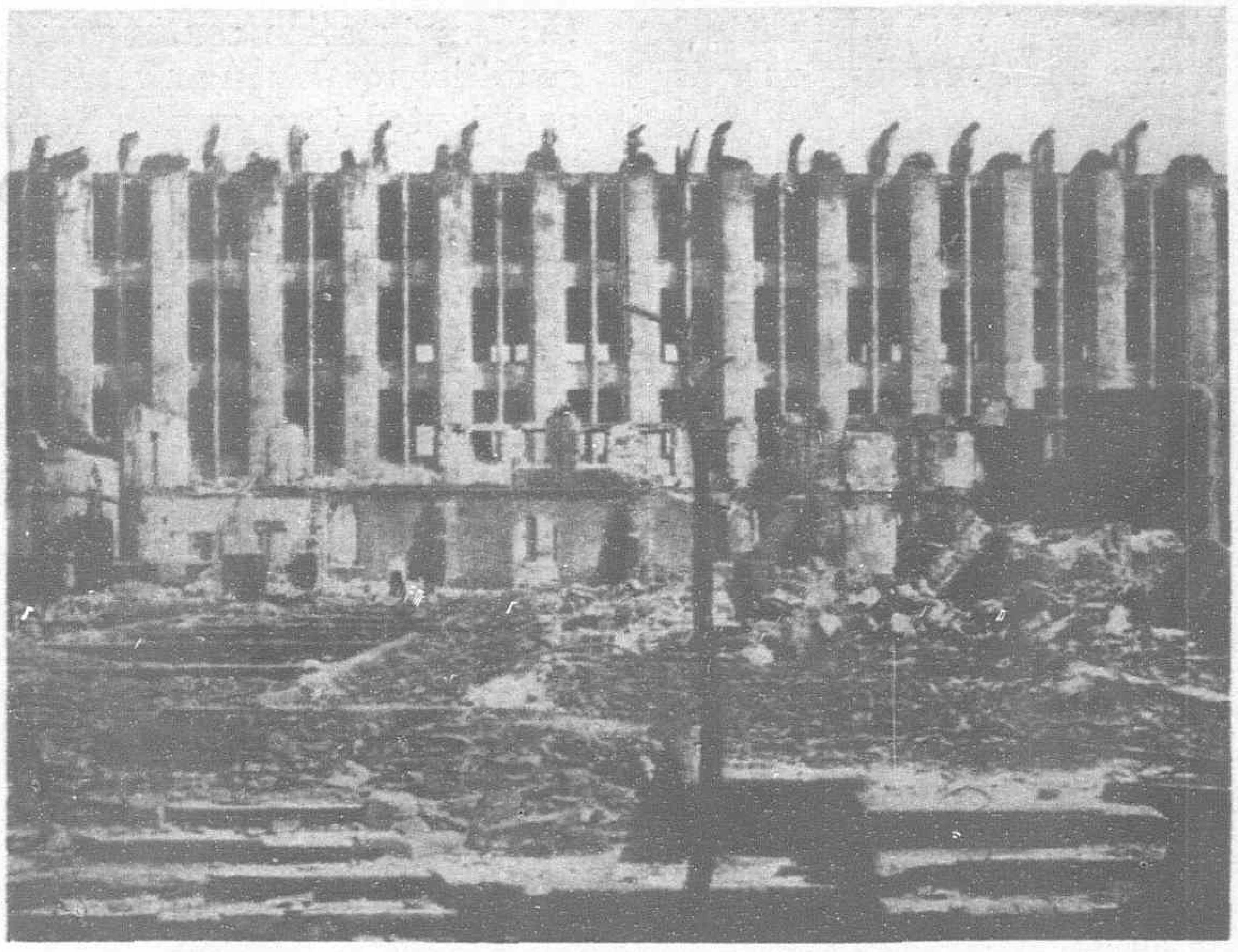


Figure 11.—New Tokyo Central Telegraph Office after Fire. In Course of Construction

the embankment and concrete wall. Such shearing or crushing occurred at places where soil and structures of different solidity meet together, for the wave motions in both were different.

Generally, in cases where cables were laid over public bridges or on special telephone cable bridges, it is a matter of course that these cables were burnt where the bridges were burnt, and even in case where the bridge itself escaped the fire, a majority of the cables were burnt by the conflagration of boats which crowded under the bridge for the purpose of getting shelter and escaping from the pouring flames and burnt ashes. In the case of concrete or stone bridges and special telephone cable bridges, which were far from the general public or not crowded by boats, cables were safe.

Office Manholes: The office manholes were safe in centrals which escaped the fire, while in burnt centrals lead sheaths of cables were peeled off leaving mere cores as entangled ropes. A majority of manholes placed in front of centrals were undamaged in appearance.

Cables in Lateral Tubes: In the burnt portion of the city a majority of cables in laterals were burnt and melted lead sheaths were stuck in the tube up to near the ground surface.

Manholes: In Tokyo the majority of the damages in manholes were cracks in its walls due to horizontal quake. In Yokohama there were many cases where only a part of the manhole body itself was shifted horizontally, leaving the cover case projecting above the ground surface by one foot or so owing to sinking of the surrounding earth; the entrance arch was damaged and cast iron conduit projected by three feet or so towards inside of manholes. It is remarkable that there were no manholes which sank below the ground surface and this is probably due to the fact that the foundation was somewhat better than the surrounding earth.

Equipment	*Centrals* Koishikawa	Takanawa	Ushigome
Switchboard ...	... Right	Slightly shifted	Right
M.D.F. and I.D.F.	... Slightly inclined	Slightly inclined	Right
Rack	... Inclined	Slightly inclined	Right
Register rack	... Right	Slightly inclined	Right
Battery—24 volt	... Right	Right	2 cells damaged
Battery—40 volt	... Right	1 cell broken	Some on upper shelf broken
Generating equipment	Right	Right	Right

Equipment	*Centrals* Yotsuya	Kudan	Awoyama
Switchboard ...	... Line of surface shifted	Nearly the same as other Centrals—All equipments here were dismantled and added to to other Centrals	Right
M.D.F. and I.D.F.	... Slightly inclined		Right
Rack ...	... Slightly bent		Right
Register rack	... Right		Right
Battery—24 volt	... 3 cells damaged		2 cells damaged
Battery—40 volt	... Some on upper shelf broken		Some on upper shelf broken
Generating equipment	Right		Right

Underground Conduits Near Riverside: In the case of roads along the river bank the parts near the river became disturbed, consequently underground conduits and manholes became exposed and cables damaged.

Open Wires: Generally it seems that the damages done to the poles and open wires were most serious where the direction of the pole line coincided with that of the quake propagation.

Damages on toll lines were nearly the same as those of telegraph lines, the number of circuits damaged amounted to 303 terminating in Tokyo, and 111 terminating in Yokohama.

Emergency Measures: The following are the measures performed concerning telephones in consequence of the disaster:

(*a*) Local exchanges: In Tokyo, for government offices pertaining to the temporary relief work and for other important subscribers, the service was opened by means of standard magneto switchboards, each of 100 subscribers' capacity, installed in a room in the Tokyo central post office, which escaped the fire as referred to above; as a next step newspaper offices, banks and other subscribers having close relation with public interest were added as soon as the line plant, instruments and materials admitted. In Yokohama, since no building belonging to the department of communications had survived, a standard magneto switchboard, with a capacity for 50 subscribers, was installed in the branch office of public works of the department for home affairs, thus service was restored to governmental offices and important subscribers just as in Tokyo. Later this equipment was removed to the barracks in front of Sakuragicho railway station.

(*b*) Toll Lines: On September 3 the toll circuits to Sendai and Utsunomiya were opened at Senju like telegraph lines and these were then cut over to the standard magneto switchboards for the toll line purposes, which were installed in the Tokyo central post office at the same time the circuits to Nagoya, Osaka and other important cities were restored. As, owing to the inherent function of the standard magneto switchboard, the toll service could not be given to the subscribers belonging to common battery offices, several pay stations were installed in the Tokyo central post office for the purpose of this service. Later, as the number of circuits increased, restriction for toll service was removed. Owing to shortage of the number of toll circuits, at first the toll service was afforded to messages relating to the relief business. On November 10 the total number of working circuits amounted to 74. Prior to this some modifications were given in order to give toll service to all subseribers in common battery offices.

In Yokohama, at first, the toll as well as telegraph service to Tokyo was opened in the waiting room of the Kanagawa station of the interurban electric railway between Tokyo and Yokohama, later removing it to the barracks above mentioned. The number of circuits to Osaka, Kobe, Nagoya and other important cities was nearly ten on November 11. As restoration of Yokohama was very slow, such number of circuits was sufficient for the toll service.

Damages Done to Radio Stations

The number of radio offices within the area of the disaster is given in the table below, 6 among 20 stations being damaged most seriously:

Administration	*Public*	*Private*	*Experimental*	*Total*
Dept. of communications	0	0	3 (3)	3 (3)
Naval department ..		2	1 (1)	3 (1)
Department of war ..	0	1	1	2
Department of railways ..	0	0	1	1
Factory	0	0	4	4
School	0	0	4 (1)	4 (1)
Others	0	0	3 (1)	3 (1)
Grand Total				20 (6)

Figures in brackets denote totally damaged.

As seen in this table no station for public service was within the area of the disaster, but by means of installations in the military office and a few equipments which survived in the communication officers training institution, immediate emergency measures were performed even before the severe shock hardly slackened. Unfortunately the installation in that institution was reduced to ashes by fire early the next morning excepting two iron towers.

The burnt out important offices, which have relation with radio engineering, are the electrical laberatory, communication officers traning institution and navel technologic research section. As these possessed the most important laboratories and research equipments in Japan, the loss which our empire encountered is very great; for we have lost importatn research results, documents. reports, etc., together with equipments which were very important for the development of radio engineering, and also preparations for coming conference on international radio communications.

It is reported that on September 1, in the communication officers training institution only a few minutes before the great quake, the resonance condition of the receiving apparatus was exceedingly deranged, when some measurements for the radio communication from North China were being investigated by the operator. Immediately after he had noticed this extraordinary phenomenon he felt the quake. Such a phenomenon might be caused sometimes by the swinging of the antenna, but the antenna in that institution was so tightly stretched that in ordinary heavy storms such a condition was never observed before. It is improbable that the operator was too earnest in inspection not to take notice of the first shock of the quake, because he felt the quake at the same time the others did. The quake in far distance might probably be mentioned as a cause for the above phenomenon, but the exact interval of time which elapsed between the first quake and the feeling of that phenomenon was not observed; so this phenomenon is cited as an instance toward solving the question to be met in the future. It may be added here that in that institution after the quake listening was continued till early next morning when that building was burnt.

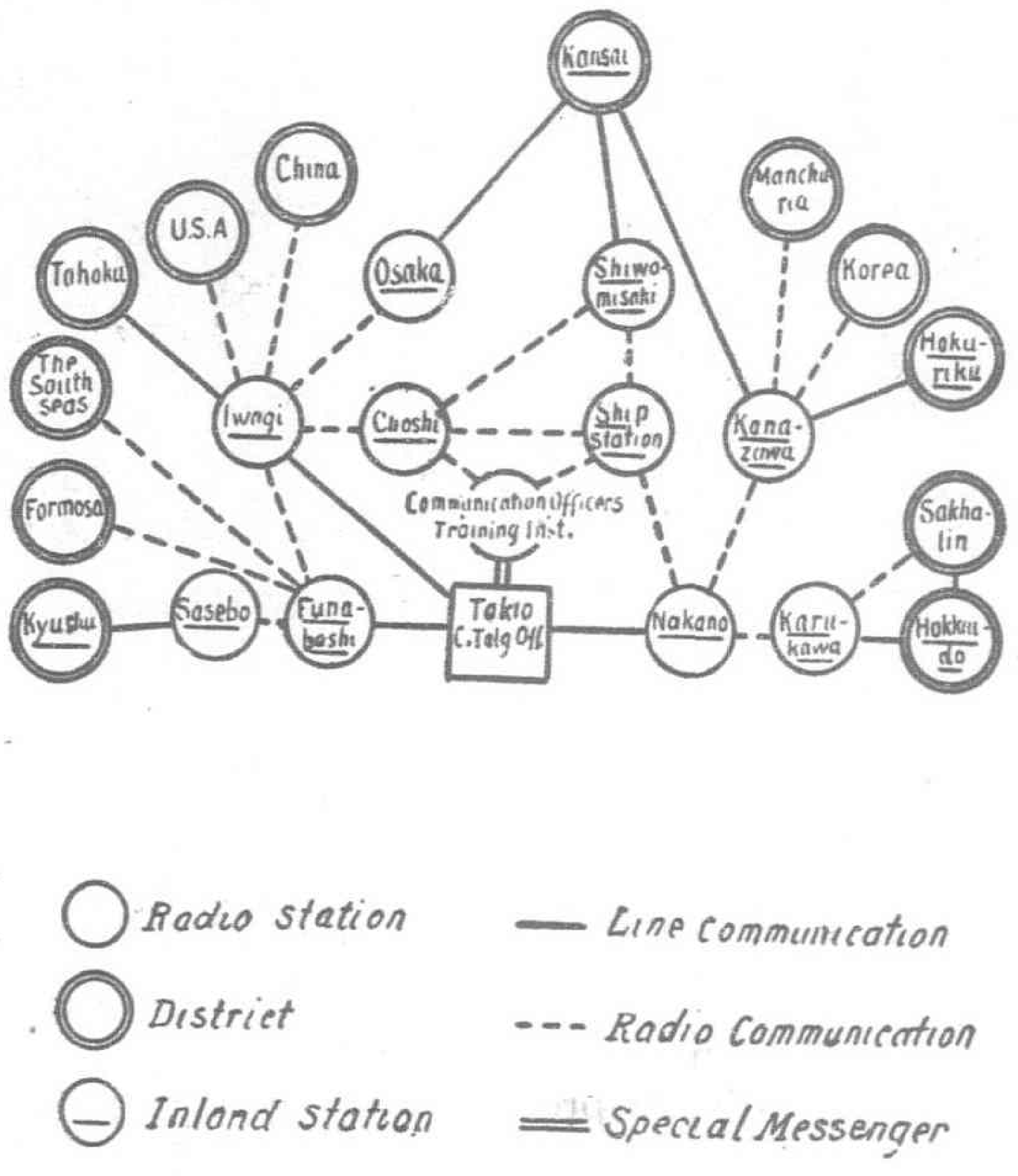
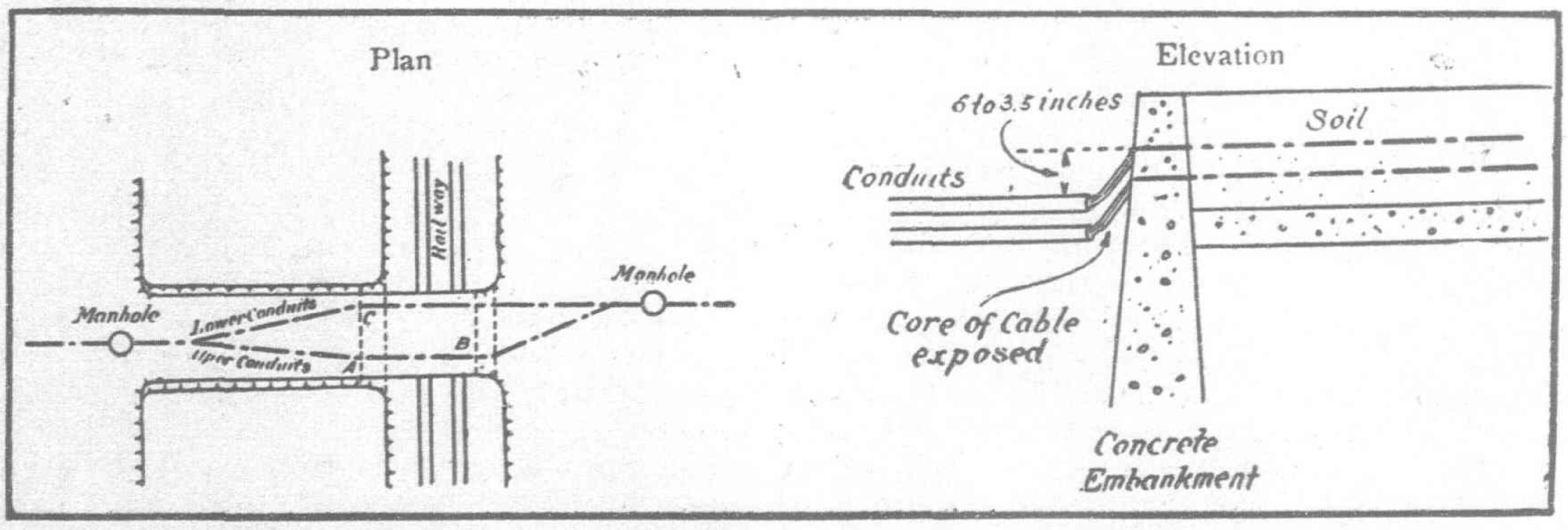


Figure 10.—Schematic Radio Communications After the Disaster

Soon after the fire a temporary circuit between the temporary Tokyo central telegraph office and the telegraph corps at Nakano was established; so that by means of the radio installation at the latter place, communication was begun to all coast stations from Tokio. It is said that in this performance in the telegraph corps, portable radio apparatus proved a great success.

After September 2, as communication between warships, which were anchored at Yokohama or Shibaura (in Tokyo), and land stations increased, their interference in Tokyo bay became fairly strong. Beside the above, Funabashi radio station was successfully used for service. The network of radio communications for the public after the disaster is shown in Figure 19 schematically.

While the above is a general description of the measures which were taken in the environs of the Tokyo central telegraph office, many of the radio stations in local districts took an active part in the communication service. The news of the great disaster of September 1 was received in Hongkong and Manila on that day via Osezaki, which was sent from Choshi and Iwagi, and on the other hand reports were sent from Iwagi directly to the United States of America and Hawaii, to that all the ships at sea listened in to these messages. Furthermore, the Iwagi station continued to send reports to America telling the conditions of Japan and translating news successively. This station contributed to a great extent in arousing in America and Europe profound sympathy for Japan, and it is especially rejoicing to note that the master and the officers of Iwagi station were publicly recognized in America. It must be mentioned here that the ship station on board the *Koreya Maru* and *Mishi Maru*, which lay anchored at Yokohama, served to communicate with every quarter of the empire, day and night on and after September 1; also all the coast stations endeavored to serve in a state of keepless and unresting condition for a fortnight. It is also reported that the Ohi factory belonging to the department of railways, and being one of the experimental stations, served to communicate with ferry-boats that ran between Tokyo and Shimizu.



Figures 12 and 13.—Damages to Cables on Public Bridges, Tokyo

The great difficulty encountered in connection with radio communication was confusion as stated above, but this was restricted to the Tokyo bay, and by order it was practically overcome by means of proper adjustment of the wave lengths.

Other Damage Done

Material or immaterial losses beside those previously mentioned were sustained from damages occasioned to the buildings of the department of communications, electrical laboratorry and technical section of the Tokyo administrative office as well as store-houses which were completely burnt. In these three offices above mentioned were located very important laboratory installations, containing therein reports of research, documents and materials for investigations relating to wired and wireless telegraphy and telephony in Japan which had been prepared by many engineers who spent many years, some in foreign countries gathering valuable reports and papers, and others at home working most painstakingly at their chosen profession. It is to be greatly regretted that these precious documents and installations were reduced to ashes and that nothing can compensate for the loss which cannot be estimated in terms of monetary value.

The disaster caused not only much inconvenience in the preparation of papers for the technical committee on international radio communications, but also it introduced great obstructions for the telegraph and telephone extension plants to be performed in future, which are being proceeded with upon a plan laid out for a number of consecutive years.

While much stock material was in store for emergency purposes much of it was lost by the conflagration, causing great obstructions to emergency measures. On the other hand, much difficulty was encountered as the more inportant business and factory quarters of the city were wiped out.

A few instances regarding information about telegraph and telephone installations will be added below, as such results of investigation of the damages caused are of some value toward preventing such disasters in future.

Office Buildings: It would be very important as well as interesting to architects to investigate the condition of buildings which escaped the damages of the quake and came comparatively unharmed through the fire. Quake and fire proof structures are to be recommended for houses in all the important parts of the city, especially for telegraph and telephone offices. Telegraph and telephone installations are urgently required in times of such disasters, and much thought should be given to selection of proper types to be adopted for these buildings. While most of the brick structures became dangerously shaken by the earthquake, reinforced concrete buildings were immune to both the earthquake and fire. In Tokyo, for instance, the building of the toll and two local exchanges at Marunouchi was destroyed by the fire with all the contents except mere structures, so that the building is being refitted for the purposes of establishing a temporary toll exchange, and housing the Tokyo central telegraph office and one of the local exchanges. Beside this, the buildings of the centrals Ginza, Asakusa, Hamacho, Horidome amd Sumida may also be utilized again by simply repairing the inside fittings. From the above it is evident that reinforced concrete building should be adopted in all cases in future.

By the first shock of the quake all water mains were interrupted, so that fires at almost every part of Tokyo and also of Yokohama got immediate headway at their will and nearly all important parts of Tokyo and the whole of Yokohama were turned into ashes. Temperature of the burning areas reached such high degree that window and other glasses and some metal parts melted as if in hearths and it is also to be noted that metal fire-shutters in all the buildings worked ineffectively. In future, much precaution must be taken in fireproofing windows, which seem to be the weakest point of buildings. Strong cyclones and high winds were caused by local temperature differences during the fires. Some people were blown upwards and carried to places some distance away. It is difficult to say what unexpected events happened during those few days. It is needless to say that all such questions must be taken into consideration by engineers who are to shoulder the responsible work of reconstruction and all measures for fire and quake proofing should undoubtedly be provided for.

Construction of Lines: In the burnt up areas the overhead telephone lines were completely destroyed by fire, though a majority of them were replaced by underground system long since. These overhead lines being for distribution purpose for subscribers, it is desirable to replace them by an underground system, if financial conditions will permit this to be done in the near future. As given in a table previously referred to, damages to the underground cables were rather slight, much less when compared with areial lines, even in the cases where manholes became flooded by water, or cast iron conduits projected into the manholes due to destruction of road and crushing of conduit. From the point of view of beauty and also for reasons of frequent faults in aerial lines, it would be advisable to put the whole system underground in both Tokio and Yokohama.

Construction of Underground Lines: A majority of manholes were flooded by drain due to loosened connections and breakages of conduits. In future, special attention should be paid to workmanship of jointing the conduits and uniformity of foundation beds along the entire underground construction.

River Crossing: For routing cables over public bridges it is safer to choose bridges of fireproof construction, such as concrete or stone work, and to wrap them with some fireproof material. It is preferable to wrap cables with fireproof substance even where special telephone cable bridges are used or to install them under river bed. In the late disaster some cables, which were otherwise undamaged, were damaged at river crossings, which caused delay in re-opening the telephone service to some extent. It would be very interesting as well as instructive to investigate methods of river crossing of cables.

Supply of Equipments and Materials: The most difficult problem encountered in making arrangements for emergency measures was the requisition of instruments and materials. Stocks of instruments and materials, which were lost by the disaster, amounted to an enormous quantity, and because many of the factories were also damaged, their supply was obtained partly from local makers, while some was imported.

Adoption of Automatic Telephone System: It is true that civilization tends to replace the manual power by the mechanical. Though it is also clear that, in case of telephone service, to use a great many operators is both uneconomical and inconvenient, owing to financial reasons the adoption of the machine switching system has not yet been realized. It is firmly believed that this is the best opportunity to replace the former inconvenient telephone by a more up-to-date and convenient automatic system, as both Tokyo and Yokohama are now deprived of telephone service almost entirely.

Installation of Radio Telegraph and Telephone: At the time of the late disaster there were no public radio stations tn the burnt-up area, which catered to the public service, and consequently no radio station was damaged; but if there had existed an undamaged one we can easily imagine its possible activity. It would have been a foregone requirement that an uninterrupted supply of electric power and a continuous communication between it and the central office were firmly established.

It is to be noted that in the last disaster the entire system of the electric power supply and lighting were interrupted for some time. From these observations it is evident that such installations should be made fire and quake proof, and that interconnections between power houses and transformer stations, between these points and consumers, etc., should be of the underground system.

Broadcasting of radio telegraph served admirably in reporting the disaster to foreign countries as well as to ships at sea. It is firmly believed that telephone broadcasting would have played an efficient part if it had existed, a good reason for its realization.

Store-houses: It is believed that store-houses in future should be not only as rigid in construction as other buildings (or rather more so) but also fireproof, as much difficulty was experienced in executing emergency measures at this time. It is safer not to centralize store-houses, but to distribute them in many quarters of the city, in spite of some inconveniences to be felt in ordinary days from the point of view of storing, shipment and supervision. At the late disaster, for instance, the store house at Shibaura remained undamaged while that in the enclosure of the department of communications was burnt. It is worth while to consider this problem.

Outline of the Program of Reconstruction Executed and Otherwise (March 1, 1924)

Telegraph

Tokio: As a consequence of the removel of restrictions for messages, as above mentioned, the volume of traffic increased tremendously. The number of circuits was increased to 76 in Eiraku building which was the full capacity of that temporary office. On November 23 this temporary office was removed to the repaired building in which the local telephone exchange Marunouchi was located. At that time some suburban circuits were added. The traffic carrying capacity of the circuits has been restored since December 12 to that of as nearly as before the disaster, being increased by 160; while some circuits for city branch offices could not be restored owing to the delay in reconstruction of buildings. At the end of the year 1923 circuits were classified as follows:

System	*Number of Circuits*
Automatic duplex	24
Sounder duplex	58
Sounder simplex	144
Morse duplex	3
Morse simplex	14
Siphon recorder simplex	1
Telephone	1
Total	245

With the addition of 11 circuits in January 1924, nearly all circuits were restored to their former capacity with the exception of local circuits in the city. These city circuits will be opened as soon as switchboard and other equipments as well as office accommodations are ready.

As far as the number of circuits is concerned, restoration will be accomplished by April 1924,* while complete reconstruction will be finished early in the year 1925. At that time the Tokyo central telegraph office will be removed to its new building which was in course of contruction before the disaster.

The pneumatic tubes in Tokyo had been installed between the Tokyo central telegraph office and eight branch offices with a route mileage of nearly 6. But all the terminals were burnt by fire and the underground tubes damaged also. The present scheme of reconstruction is to connect the first four branch offices with the central when the permanent office is opened; making a route mileage of 3.5. Successively for 13 branch offices a mileage of 20 in the year 1925, and for four branch offices a mileage of 8.5 in the year 1926 will be added connecting with the central office respectively.

---

*Dates appearing in this article are published without change. Attention is called to the fact that the program of reconstruction is dated, March 1, 1924.

Yokohama: As previously described, 19 circuits were restored by the emergency measures in the temporary office at Sakuragicho, while at the end of November these were increased to 26. 39 circuits were totally restored in the first part of January 1924, the office being removed to the new building. These circuits may be classified as follows:

System	*Number of Circuits*
Automatic duplex	1
Sounder duplex	8
Sounder simplex	28
Morse simplex	2
Total	39

Complete restoration will be accomplished in April, 1924.

Telephone

Tokyo. (*a*) Exchanges: Prior to the disaster, in Tokyo, there were one toll and 19 local exchanges, serving about 83,000 telephone stations. Among them the toll, 15 local exchanges and nearly 52,000 stations were burnt or wrecked by the disaster. An area of 13.5 square miles in the city of Tokyo was burnt to the ground, 30.5 square miles being the total area. The remaining centrals were re-opened on September 29, after urgent repairs to office equipment and line plant. The number of stations in those four centrals are given below:

NUMBER OF STATIONS

Central	*Before Disaster*	*Burnt or Wrecked*	*Opened on Sept. 29*
Awoyama	2,416	0	2,416
Koishikawa ..	6,836	699	6,137
Ushigome	4,172	0	4,172
Takanawa ..	4,473	125	4,348
Total	17,897	824	17,073

Since the localities which are covered by the above centrals are situated on more or less hard bed ground, damages to them were comparatively slight.

It is of interest to give a brief description about the traffic data on telephone service during the first three days after re-opening the four centrals. The average number of calls per station per day was 2.5, while 8.5 was the average during last August, just before the disaster.

Immediately after the above centrals were re-opened efforts were made to connect those subscribers who were most urgently in need of telephone service, and who were scattered over all quarters of the city, to any one of the above four centrals according to their locations, by the aid of inter-office trunk lines. Thus a total of 20,743 stations were restored by the end of the year 1923. The temporary local exchange Ote was opened with a capacity of 4,000 in the burnt building of central Marunouchi. By the end of March the central Yotsuya will be re-opened, after repairs to that building are accomplished. Thus, a total of 30,000 stations will be restored. By the extension of the switchboards in the above six offices, 9,000 stations will be added by the end of August.

Two of the four burnt offices, the buildings of which are in course of repairs, will be re-opened in the fall of 1924 and the other two by February 1925, the common battery system being employed. By March 1925, the total sum of stations restored will be enumerated by 64,100, there being 83,000 before the disaster.

Besides the total of ten exchanges, thus restored, four and five automatic exchanges will be opened by the end of fiscal year of 1924 and 1925 respectively; one of them being planned to supplant the temporary common battery office Ote. Restoring of the remaining 19,000 stations in Tokyo will be accomplished at the same time.

The program of measures for telephone re-construction is expected to extend for a period of 2½ years, rather longer than usually accepted. In justification to the length of the reconstruction period it might be mentioned as follows. It is, of course, true that restoration of telephone service should be done as quickly as possible, as it is one of the most essential for reconstruction of Tokyo. On the other hand, it may easily be justified that the work of reconstruction of the multi-office telephone area, which has stations numbering more than 80,000, cannot be treated as simply as the case of several independent telephone areas of moderate capacity. For the preparation of switchboards, first of all, a great difficulty is encountered. As several of the factories for telephone industry were damaged it must be expected that a rather longer delivery for home made is inevitable. Many foreign makers also offered earnest suggestions for the restoration of telephone system, but they could not supply switchboards of the specified type at the specified time of delivery. To adopt many different systems of switchboards in the present case in Tokyo, must be carefully considered, from the point of view of inconvenience and want of economy in operation and maintenance.

On the other hand, security of service cannot be expected if telephone offices were installed in imperfect buildings like barracks. Moreover, owing to probable alterations in the street contours, as a consequence of the city's reconstruction planning, construction of permanent buildings is not allowed before that plan is settled. To build offices with risk of removal within two or three years, cannot be thought of. It is thought not unlikely that a total of 30,000 stations can be restored by March, 1924, and 64,000 by March, 1925. With this number it is expected that a restoration of service to all subscribers, at least one substitution for each subscriber, and also a fairly ample service may be given in Tokyo, the condition of general business being depressed to some extent compared with that before the disaster. A careful investigation regarding every point leads to the conclusion to adopt the program of telephone reconstruction outlined as above.

(*b*) Toll Line: After the emergency measures, as previously mentioned, were taken on December 1, 1923, the temporary toll office was removed to the repaired building of the old Marunouchi, where equipments were provided for 164 circuits. The number of toll lines will be increased to 277 by the end of March, 1924, and it will not be so long before all circuits, 317, will be restored; while in the fall of 1925 the permanent toll exchange will be opened.

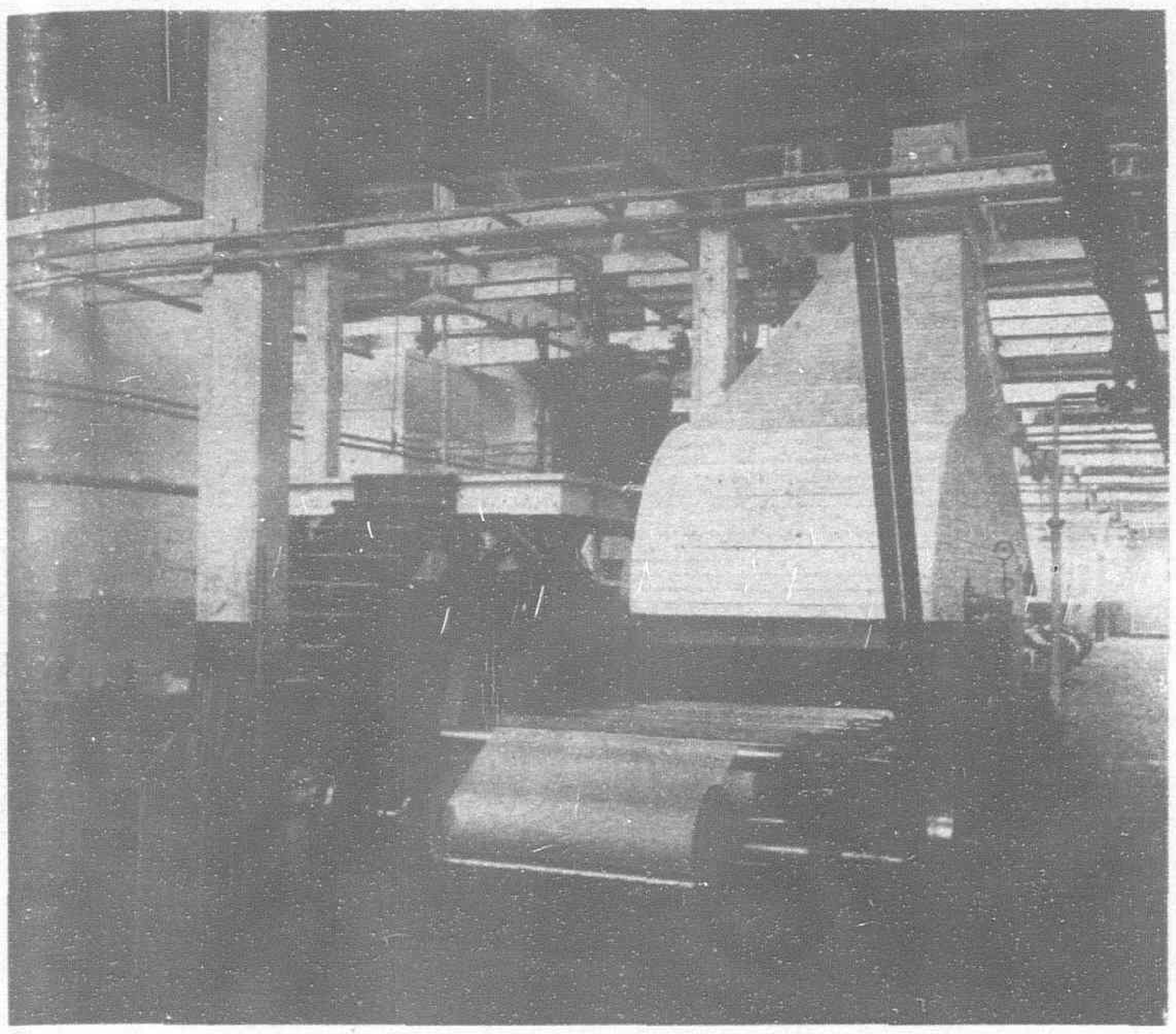
Yokohama. (*a*) Local Exchange: While there were in Yokohama one toll and two local exchanges, serving 10,600 stations, the whole was practically destroyed. On September 29, 1923, 30 subscribers were restored and this increased to 450 by the end of that year. It is planned to restore 2,000 stations in the new temporary office by March 1924, the switchboard being of the magneto parallel multiple type removed from a central which was recently closed in Tokyo; by June 1924 the sum of stations will increase to 3,700. In the fall of 1925 two automatic exchanges will be opened, where all the subscribers will be cut over and all the remaining stations will be restored at the same time.

(*b*) Toll Line: The number of toll lines in Yokohama before the disaster was 111. Gradually increasing the number of line restored, a total of 35 were completed at the end of the year 1923. The sum of restored lines will become 73 by the end of 1924 and 111 by 1925; thus making all restored.

It must be added that when the automatic system supplants the manual local exchange the permanent toll office will be opened.

Motor Trailers for Indian Rajah

An innovation in India is to be the introduction of motor trailer caravans for one of the important Indian rajahs. They are one of Birmingham's latest creations. Two in number are these sumptuous caravans which are fitted with bath, bed, dressing and sitting rooms, and are to be hauled each by one of the rajah's Rolls-Royce cars. In their construction—the size is almost that of a railway coach—they are quite unique productions, being specially designed and protected to resist the tropical heat of the Indian jungle. The fittings are most elaborate, and it is said that these caravans will be used by the rajah on his shooting expeditions across country. Judging by the appearances of his new Birmingham acquisitions he is indeed a favored mortal.



Weaving Room in the Heng Yuen Mill, Tientsin

Machine Shop, Heng Yuen Mill, Tientsin

Cotton Mills and Raw Cotton Supply in Tientsin

AS early as 1910 attempts were made by officials and members of the local gentry at Tientsin to organize a cotton mill, but their plan was frustrated by the outbreak of the revolution. In 1914 the Chihli Model Weaving Co., which has since changed its name to the Heng Yuan Mill was planned and two years later opened. Meanwhile the war in Europe caused the price of yarn and cloth to soar abnormally high, and several mills, including the Yu Yuan and Wah Sing, sprang into existence. At present there are six cotton mills in Tientsin, having a total of 210,000 spindles.

The slump following the conclusion of the European war affected Chinese cotton mills. In 1922, owing to trade depression, the mills in Tientsin proposed to limit their output by partly suspending operations. In February, 1923, the Tientsin mills obtained a ruling from the Ministry of Agriculture and Commerce forbidding establishment of any new mill at places within 500 *li* (200 miles) of Tientsin in the next 20 years. This has effectively put a check on the production of cotton yarn and cloth. The rise of native mills in Tientsin has greatly influenced the volume of yarn import trade.

The following figures show the quantity of cotton yarn in piculs imported into Tientsin from different sources between 1924 and 1922 :—

Year.	From other ports of China.	Japan.	India.	Great Britain.	Total.
1914	130,109	292,800	107,519	384	530,812
1915	147,076	373,834	166,806	141	987,857
1916	178,972	315,994	125,808	—	620,774
1917	186,973	239,050	109,605	—	535,628
1918	159,053	192,822	50,419	—	402,294
1919	155,384	184,269	47,149	—	386,802
1920	122,326	149,585	20,714	2,105	294,730
1921	146,426	177,381	17,002	—	340,809
1922	157,495	191,908	1,842	2,317	353,562

Of the six mills now operating at Tientsin, five are financed entirely by Chinese capital. The Yu Ta is a Sino-Japanese joint undertaking. These have in total 800 weaving looms. Of 210,000 spindles, 147,500 are now operating. The accompanying table shows the capital, working capacity and other particulars of each of the mills there :

	Established.	Capital.	Spindles Erected.	Spindles Operating.
Heng Yuan (North)	1914	$4,000,000	30,000	10,000
Yu Yuan	1916	5,100,000	70,000	47,500
Wah Sing	1916	2,000,000	35,000	25,000
Pei Yang Commercial No. 1 ..	1920	2,000,000	25,000	25,000
Yu Ta	1920	3,000,000	35,000	15,000
Pao Chen ..	1920	3,000,000	25,000	25,000
	—	$19,100,000	210,000	147,500

	Spindles Being Erected.	Looms.	Varieties of Yarn Produced.	Varieties of Cloth Produced.
Heng Yuan (North) ..	10,000	300	10, 12, 14, 16 & 20	Canvas and Native Cloth
Yu Yuan	—	500	10, 16 & 20	Native Cloth
Wah Sing	—	—	10 & 16	—
Pei Yang Commercial No. 1	—	—	10, 16 & 20	—
Yu Ta	—	—	10 & 16	—
Pao Chen	25,000	—	10 & 16	—
Total	35,000	800	—	—

Five hundred new homes were recently ordered by the Yu Yuan and are now being installed.

Owing to its political connections, the Heng Yuan sustained serious losses as the result of the Fengtien-Chihli strife in 1922. The Yu Ta is said to be also in financial difficulties. The Yu Yuan made enormous profits during the European war, and this was followed by a rapid extension of the work, with the result that the greater portion of its capital is now tied up in fixed assets. It has been compelled to suspend a part of its work owing to the present slump. The remaining three the Wash Sing, Pei Yang Commercial No. 1, and Pao Chen are all doing well, notwithstanding the depression.

There are reasons why Tientsin is a centre of the cotton industry: (1) It is within easy reach of the large Kailan coal mines, which supply comparatively cheap fuel to the mills, and (2) the quantity of raw cotton produced in its hinterland, especially the interior of Chihli and Shantung, is increasing yearly. Since 1919 Tientsin has become one of the important raw cotton exporting centres in the country.

Several varieties of raw cotton are exported to foreign countries from Tientsin. Most of them are produced in the hinterland of the port, though some come from as far as Shanghai and Chinese Turkestan. The best known is the Yu Ho cotton, which is produced in the south-eastern part of Chihli province and north-western part of Shantung, including Wuchiao, Tsingho, Weihsien, and Nanking. There are really two cotton-producing areas. (1) The belt in the neighborhood of Wuchaio extending 400 or 500 *li*. The annual production in this region is estimated at between 7,0,000 and 80,000 piculs. Cotton coming from that quarter is known in Tientsin under the local name of Lienchen cotton, because the product is assembled at the neighboring railway head of Lienwuchen, before being shipped to Tientsin. (2) The belt in the neighborhood of Chingho with Nankung as its centre. This comprises an area of about 4,000 square *li*, producing between 120,000 and 130,000 piculs of raw cotton. A part of the produce in this neighborhood is shipped to Tsinan, Shantung province, and a part to Tientsin.

Certain districts in Shantung, including Lientsing, Enhsien, Kaotang, also produce Yu Ho cotton. Here the belt with Lintsing as its centre extends from Kaotang and Enhsien in the east to Kwantao, Tungchang, Tangyi and Tsingping, in the south and the banks of the Weiho and the Grand Canal in the north and west, consisting of 8,000 or 9,000 square *li*. The yearly production is estimated at between 200,000 and 300,000 piculs. In a normal year the total production of these regions amounts to over 400,000 piclus, of which between 150,000 and 160,000 piculs are exported to Tientsin, about 100,000 piculs to Tsingtao, and the remainder consumed locally.

The staple of the Yu Ho cotton is soft and white. The average length is between 0.85-in. and 0.87 in. It is extensively used by cotton mills for spinning 16-count yarn. That produced at Wuchiao is of the best quality, and the Weihsien product ranks next. The same variety from other districts is inferior, because its staple is coarse. The farmers seldom gin the cotton or bring the lint to the market, but sell their raw produce to the local cotton dealers through commission agents. The local dealers tranship the cargo to either Tientsin or Tsinan, Liang Chia Chi, Kan Chia Chi, Nankung, Tingho, Kaotang, Hsiatsin, and Lintsing are the local collecting centres for Yu Ho cotton.

Hsi Ho cotton is produced in parts of Chihli and Honan, especially in the Hsi Ho Valley. Generally speaking, this variety is inferior to the Yu Ho, but under favorable conditions it produces longer staple. There are three producing centres: (1) the districts to the south-east of Chengting, Chihli province, such as Kaocheng, Lwangcheng, Yuanshih, and Kaoyi, forming a total area of 9,000 square *li*, with a yearly production of 400,000 piculs; (2) the neighborhood of Hantan, including Hantan, Linglo, and Wuan, comprising 2,000 square *li*, and producing between 50,000 and 70,000 piculs a year; and (3) a belt extending from Tzechow, Chihli province to Changteh, Honan province, covering 1,500 square *li*, and producing between 400,000 and 500,000 piculs a year.

The lint of Hsi Ho cotton is white, with a delicate greenish shade. Its stalpes are short and stiff, but of greater elasticity than other Chinese varieties. By reason of this, manufacturers mix Hsi Ho with wool in weaving felt and rugs. It is also used for making gun-cotton and bandages. Hsi Ho cotton, especially that produced in the valley of the Hu Tu river, makes excellent wadding. Considerable quantities are exported to America and Europe. Cotton produced in the neighborhood of Chaochow, Chihli province, resembles in certain respects both Yu Ho and Hsi Ho cottons, but its staple is longer and finer than Yu Ho, and it is now chiefly used by the Tientsin mills in spinning yarn of 16-counts. The adoption of a new method of seed removing has improved the quality of Yu Ho lint to a considerable extent.

The movement of cotton from the producing districts to Tientsin is generally by waterway, sometimes by the Peking-Hankow railway. Shihkiachwang is the collecting centre for consignments transhipped to Tientsin. Several foreign firms in Tientsin have agents there. Cotton produced in districts to the south-east of Chengting is shipped to Tientsin by the Wuan Yang river and that to the north of Chengting is brought to Tientsin by the Hu Tu river. In both cases the journey takes about ten days, and the cost of transportation ranges from 60 to 80 cents a bale of 120 catties, or 160-lb. Cotton produced in the western part of Chihli province is shipped to Tientsin either by the Peking-Hankow railway to Paoting and thence to Tientsin by native boat, or by the Peking-Hankow and the Peking-Mukden lines. In the former case, a week is taken in transportation and the cost is about $1.75, silver, a bale, while transportation entirely by railway costs about $2.80 per bale, though it takes only four days. Chaochow, Kaocheng, Lwangcheng, Chengting, Yuanshih and Kaoyi are the local cotton trading centres.

Districts in the neighborhood of Hantan are not so suited to cotton growing as are other parts of the province. The yearly crop is about one picul of raw cotton per *mow*, or 800-lb. per acre. The percentage of lint from the raw cotton is below 40. Only a small quantity is exported to Tientsin from this neighborhood. The bulk of the crop is shipped to Honan province and to Hankow. Hantan and Limmingkwan are the local cotton exporting centres. That produced near Changteh, Honan, is generally consumed by local mills. The surplus is shipped to Chengchow and Hankow. But little finds its way to Tientsin.

Shensi is a well-known cotton-producing province, and its output has been increased in recent years. Since the suppression of opium cultivation, cotton has taken the place of poppy. The quality of Shensi cotton is superior to other native varieties. Shensi cotton is chiefly used by the Shanghai mills in spinning 16-count yarn. The bulk of the yearly produce of the province is exported to Hankow and Shanghai. In former years only about 22,000 piculs of raw cotton came to Tientsin every year, but the figure has been steadily increasing since the establishment of cotton mills in the port.

There are three different ways by which shipments of Shensi cotton are brought to Tientsin: (1) from the producing districts by mule carts to the railway terminus at Kwanyintang, Honan province, where the cargo is transhipped to Changchow by the Pien-Lo railway; (2) from the producing district to Changchow by the Wei river and the Yellow river; or (3) by boat to Szeshui, Honan province, where shipments are reloaded in mule carts and brought to Kwanyintang, whence they reach Changchow by the Pien-Lo line. Most of the shipments are carried to Changchow by the Wei river and the Yellow river, owing to the comparative low cost of water transportation, but, in view of the gorges and rapids in the Yellow river near Kwanyintang, this entails considerable risk. One or two junks out of every ten are estimated to be wrecked or overturned in this neighborhood as they pass.

The cotton-producing districts in Shansi are confined to the valley of the Feng river, including such districts as Hungtung, Yungho, Kuwo and Pingyao. The bulk of the crops is exported to Hankow. Only about 20,000 or 30,000 piculs are marketed at Tientsin yearly. Most of the varieties of Shansi cotton are of foreign origin. Their staples are long and soft. Transportation difficulties prevent Tientsin from importing great quantities of Shansi cotton, as it takes about 15 days for a shipment to reach Tientsin. The greater part of the way has to be covered by mule carts. The long journey causes damage and losses to the shipments, due to defective packing.

Tung Ho cotton is an important commodity on the Tientsin market. There are three producing areas, all near Tientsin. Cotton coming from each of these areas is known by different local names in Tientsin. The Hsiao Chi is produced near Fengjun, Chihli province, in a district comprising about 2,000 square *li*, including Hsiaochi and Sukochwang. The total yearly product is about 40,000 or 50,000 piculs. (2) Yangtsun cotton is produced in the neighborhood of Yangtsun, where the producing belt extends to Siangho, covering about 1,800 square *li*, where about 10,000 piculs are produced yearly. (3) That produced in the neighborhood of Wuloyen has no particular local name. The yearly produce from this region, which lies between the other two belts just referred to, amounts to about 8,000 piculs.

The different varieties of Tung Ho cotton are mostly of foreign origin. The seeds were brought from America by missionaries. The staples are long, fine and soft, and suitable for spinning yarn of medium grade. The cost of cultivation per mow in the neighborhood of Yangtsun is estimated at $16.60 (U.S. $8.30) and a

(Continued on page 127.)

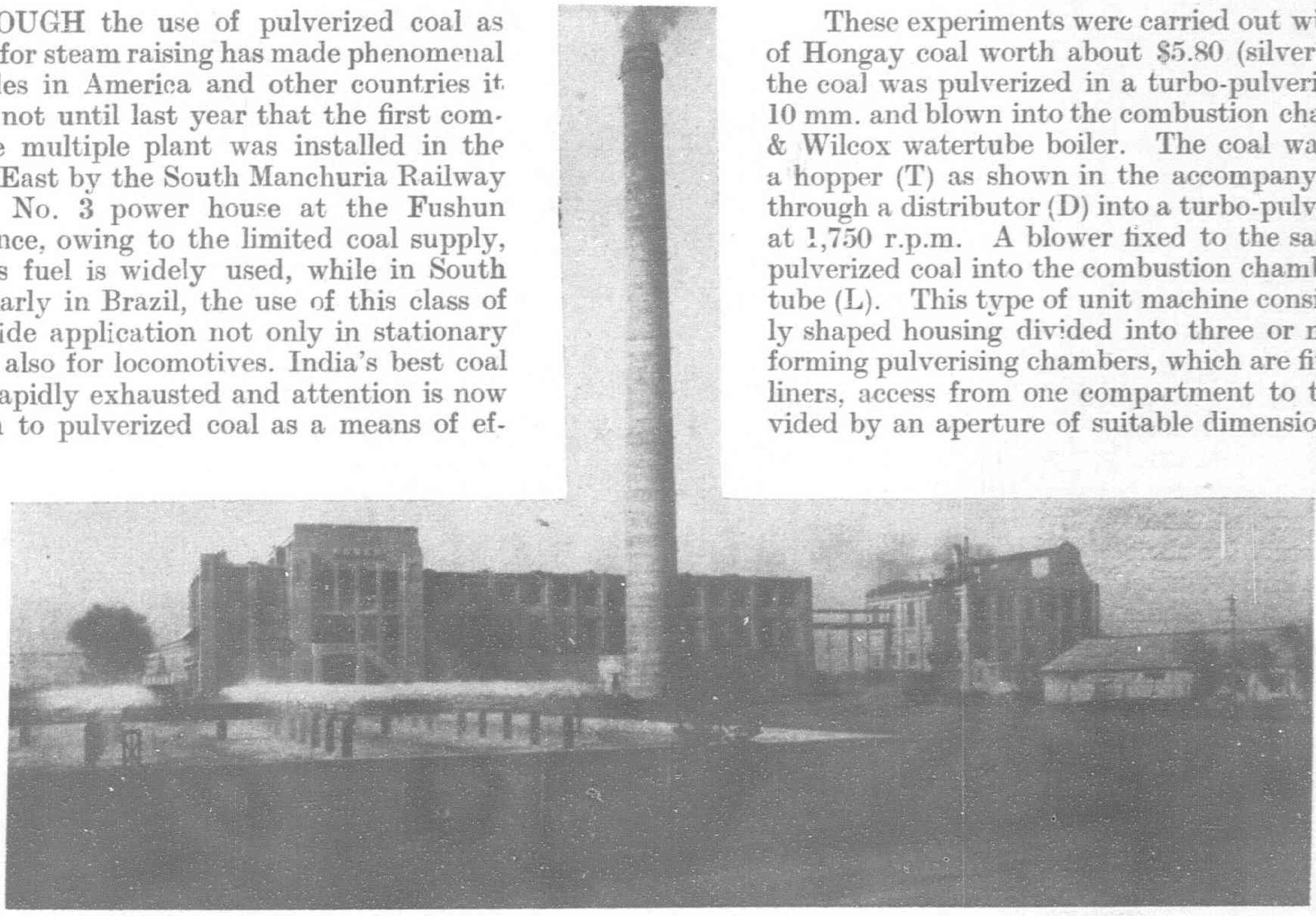
Pulverized Coal Plants in the Far East

The Splendid Record of the Fushun Power House

ALTHOUGH the use of pulverized coal as fuel for steam raising has made phenomenal strides in America and other countries it was not until last year that the first complete multiple plant was installed in the Far East by the South Manchuria Railway Company for its No. 3 power house at the Fushun Colliery. In France, owing to the limited coal supply, pulverized coal as fuel is widely used, while in South America, particularly in Brazil, the use of this class of fuel has also a wide application not only in stationary steam plants but also for locomotives. India's best coal seams are being rapidly exhausted and attention is now being focussed on to pulverized coal as a means of efficiently using the lower grade deposits.' In the Far East some interesting experiments have been carried out in Tonkin by the Societe Chanbonnages du Tonkin operating the Hongay coal fields in which a unit system installation was employed for pulverizing and burning.

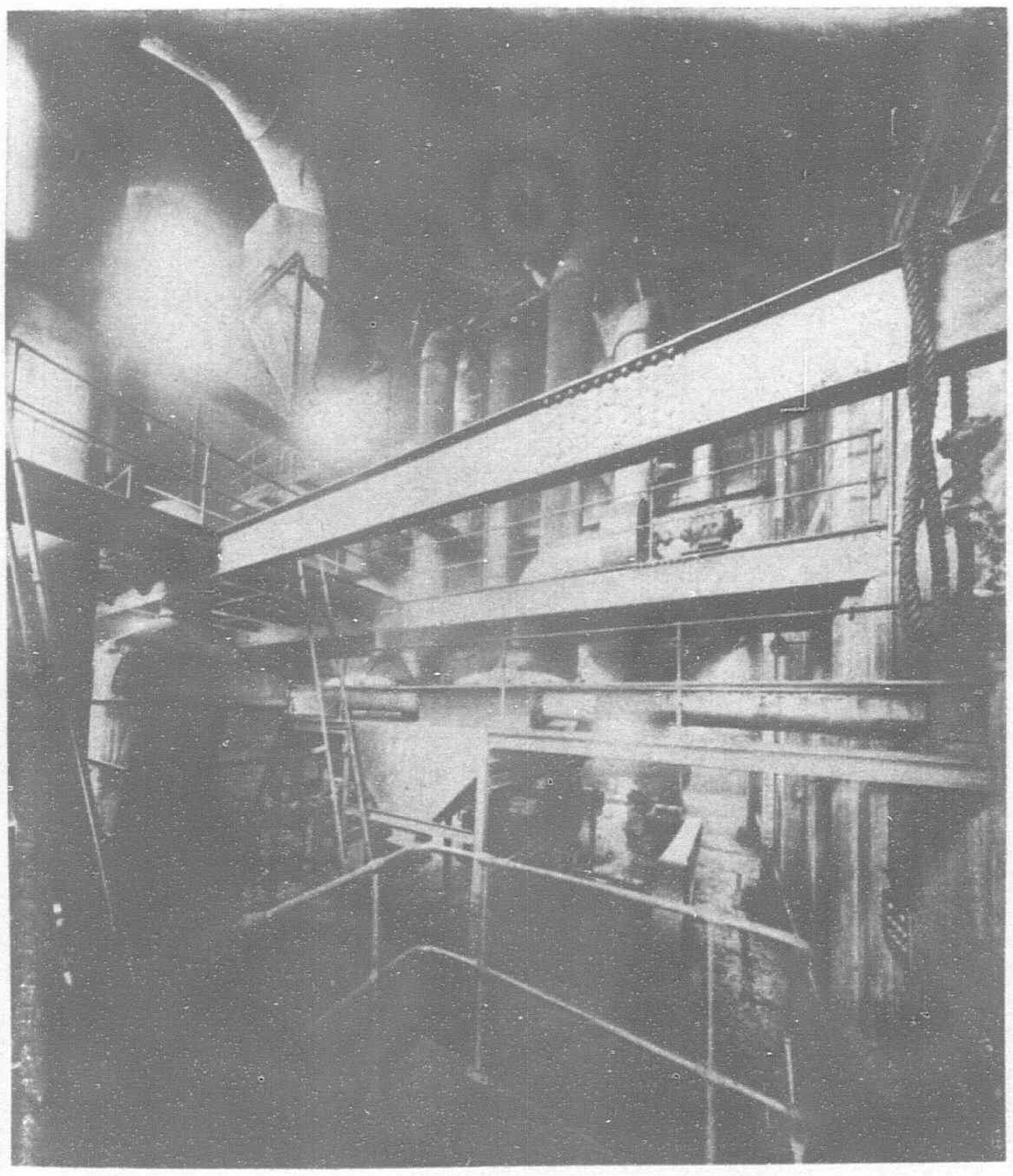
These experiments were carried out with the lower grades of Hongay coal worth about $5.80 (silver) per ton, in which the coal was pulverized in a turbo-pulverizer to a fineness of 10 mm. and blown into the combustion chamber of a Babcock & Wilcox watertube boiler. The coal was fed by hand into a hopper (T) as shown in the accompanying sketch, passing through a distributor (D) into a turbo-pulverizer (P) operating at 1,750 r.p.m. A blower fixed to the same shaft blows the pulverized coal into the combustion chamber (B) through the tube (L). This type of unit machine consists of a cylindrically shaped housing divided into three or more compartments forming pulverising chambers, which are fitted with renewable liners, access from one compartment to the next being provided by an aperture of suitable dimensions.

The pulverising medium consists of a number of rotors equal to the number of compartments, which carry a number of beaters on the periphery, the whole being mounted on a common shaft. A fan, which is also mounted on the shaft, is situated at the opposite end to

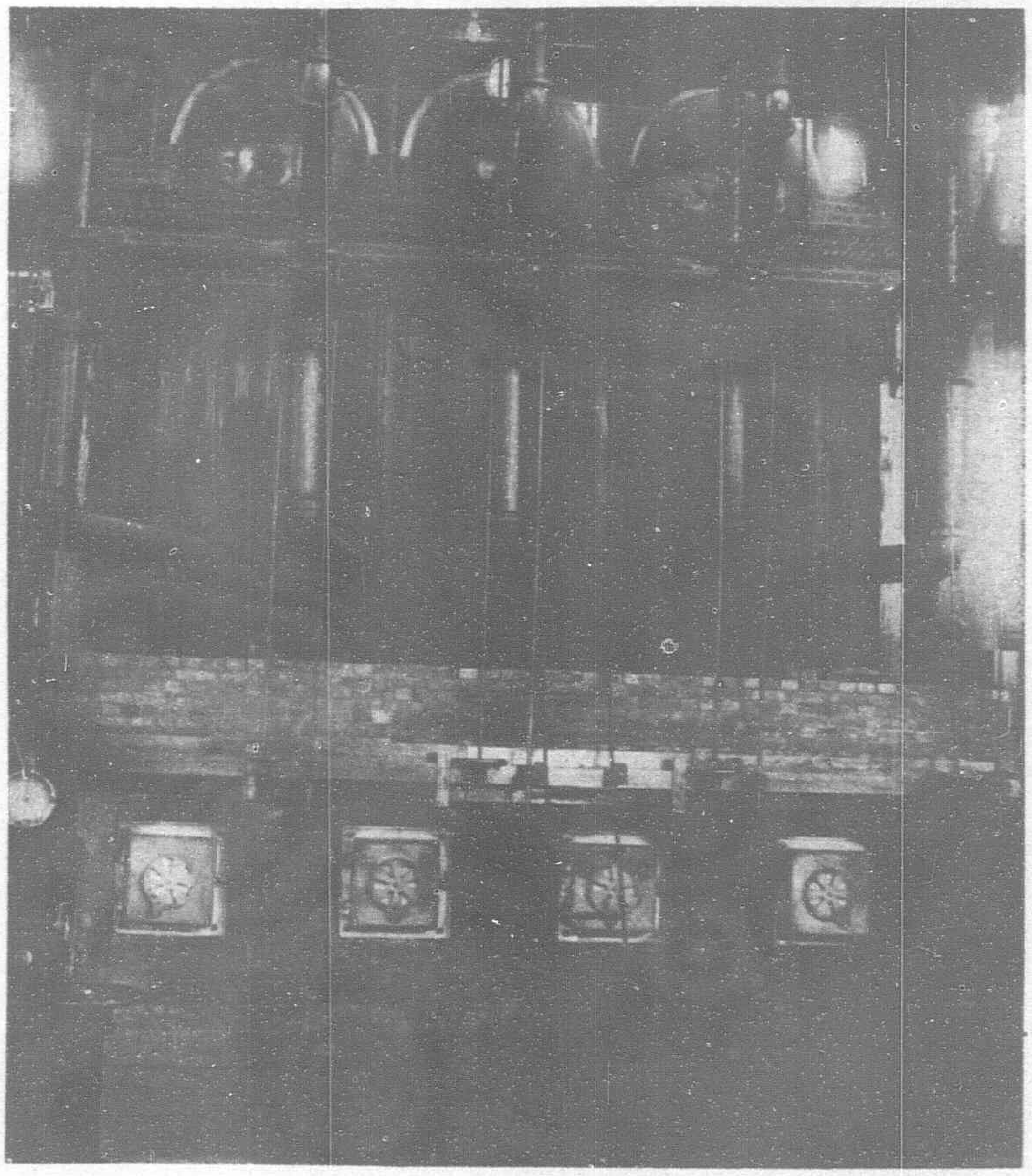


GENERAL VIEW OF NO. 3 POWER HOUSE OF FUSHUN COLLIERY

Building to the Right is the Pulverized Coal Plant: Main Building Houses the Boiler and Generating Rooms. Spray Coaling Pond in Foreground



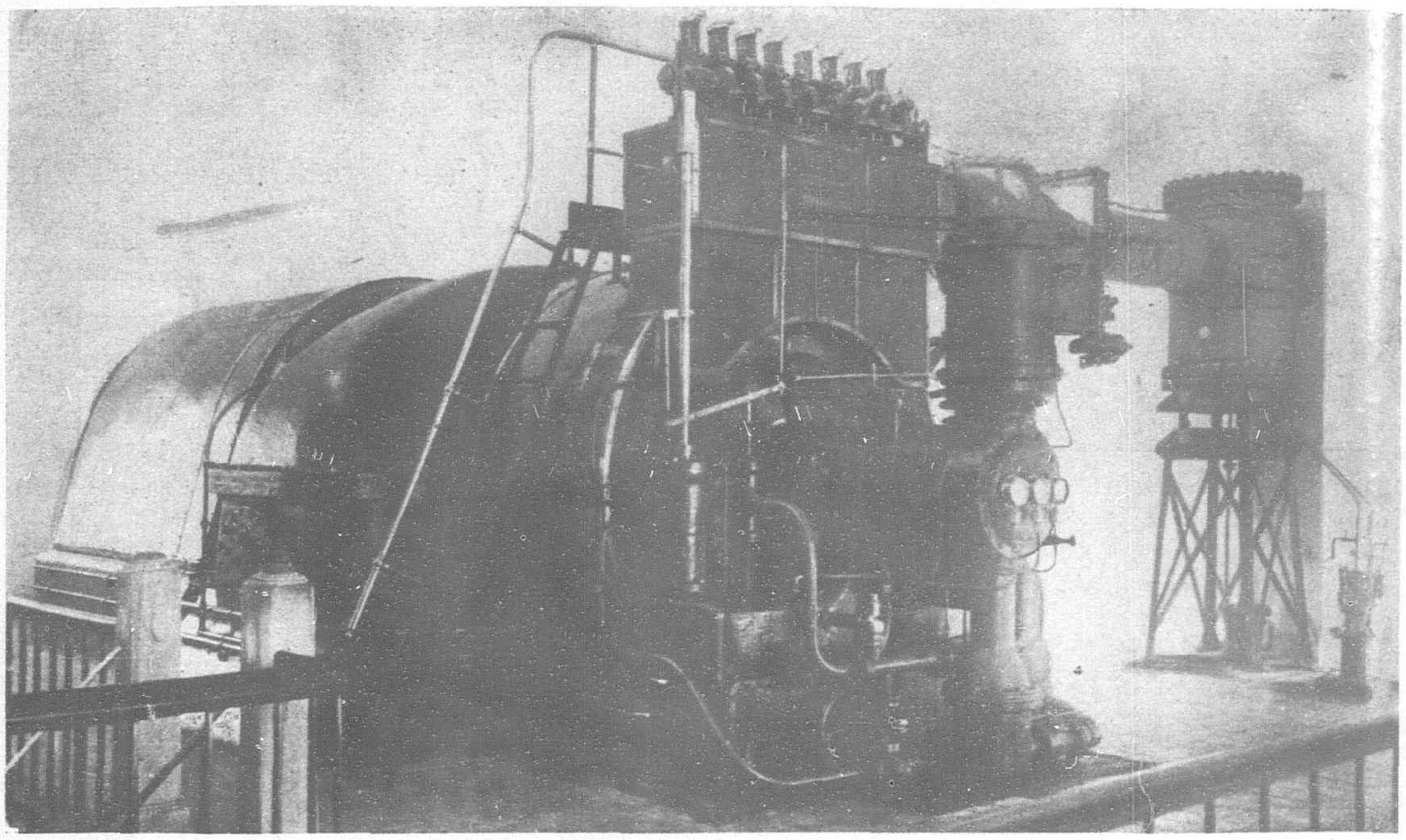
Crusher Room of the Holbeck Pulverized Coal Plant at the No. 3 Power House of Fushun Colliery



Front View of Babcock & Wilcox Boiler Equipped to Burn Pulverized Coal at Fushun the feeding gear in a special compartment and its purpose is to induce a draught of air through the pulveriser, which carries in suspension the finer particles from one compartment to another. This installation gave excellent results and further trials are now being carried on in order to obtain the best results from the Hongay coal.

In Formosa, elaborate tests are also being carried forward in order to efficiently utilize the lower grades of coal found in the island.

In 1920, the Formosan railway authorities ordered three "Lopulco" pulverized coal equipments and one pulverizing plant for their locomotives. These were placed in operation in November 1922 and gave such excellent results that two more "Lopulco" equipments were ordered. These plants are manufactured by the International Pulverized Fuel Corporation of New York, the foreign department of the Combustion Engineering Corporation, for whom Mitsui & Company are the agents in Japan. The working results of these Formosan plants were published in the November 1923 number of THE FAR EASTERN REVIEW. There is also one pulverized coal plant operating in Japan. Aside from these minor installations, the credit for erecting the first complete pulverized coal plant in connection with a large power house goes to the South Manchuria Railway Company. In this, as in many other engineering innovations, the technical staff of the railway has taken the initiative in applying and trying out under Asiatic conditions the most up-to-date and efficient methods.

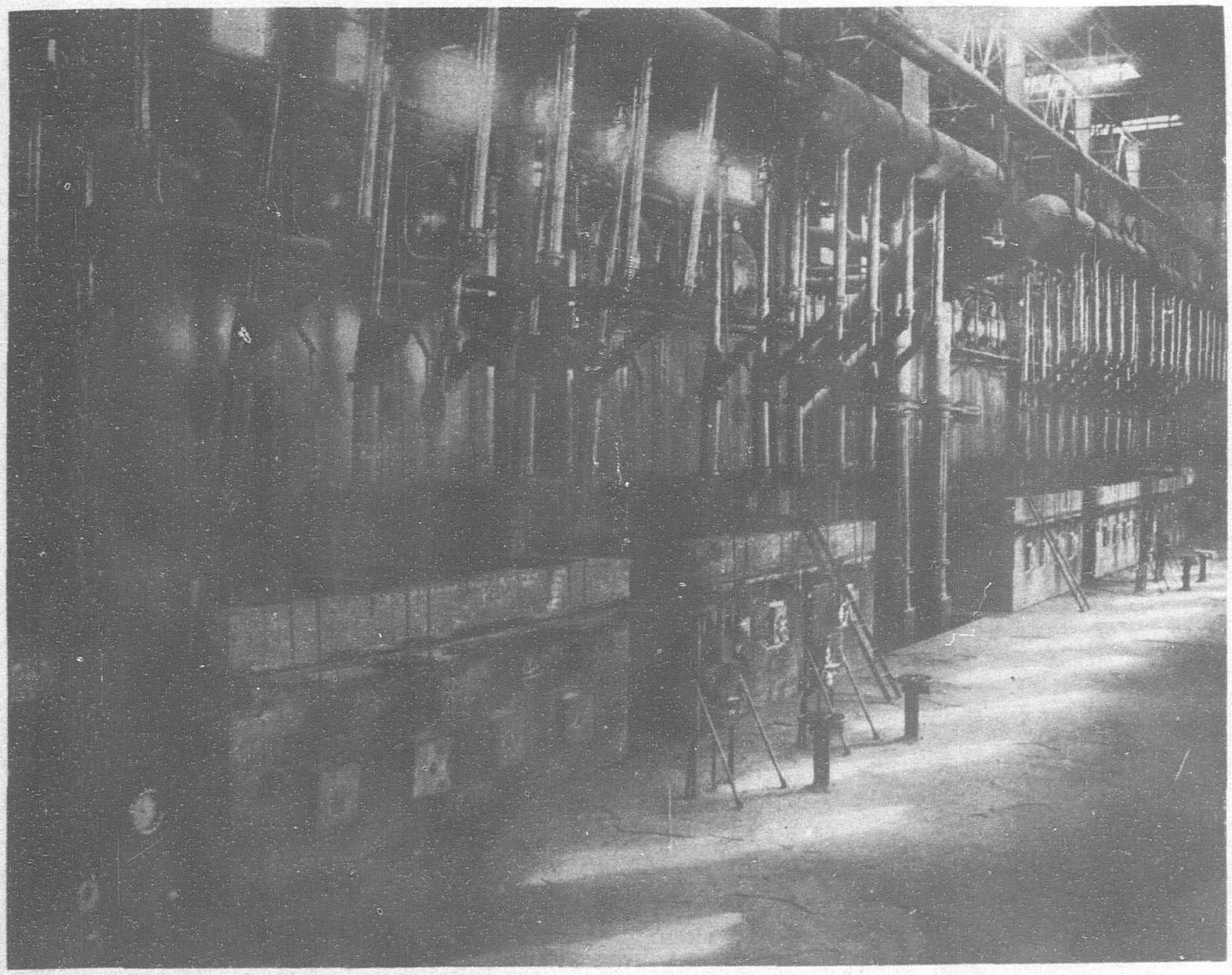


12,500 k.w. General Electric Curtis Turbo-Alternating Set in the No. 3 Power House of Fushun Colliery

In designing the new power-house for the Fushun colliery, the S.M.R. engineers decided to install a pulverizing equipment that would utilize the dust and inferior qualities of coal, of which about 500,000 tons per year are mined at Fushun and for which there is no market. This new power house, specially designed to generate and transmit power over fifty miles from Fushun to Mukden and Liaoyang, is equipped with one General Electric-Curtis turbo-alternating set of 12,500 k.w. operating at 1,800 r.p.m. delivering 820 amperes at 11,000 volts. There is also a spare G. E.-Curtis set of 1,500 k.w. capacity, delivering 1,569 amperes at 2,300 volts. Steam is produced in a battery of six Babcock and Wilcox water-tube boilers especially equipped to burn pulverized coal.

The S. M. R. engineers recommended the use of the multiple or central milling plant system for pulverized coal burning in which the coal is prepared in a separate building and transported therefrom to the furnaces, and adopted the equipment manufactured by the Holbeck Engineering Company of Cleveland, Ohio. The diagram shows the general layout and working of this system. In the Fushun plant three Bonot's pulverizers having a capacity of five tons per hour reduce the coal to a fine dust after which it passes through the various stages to be fed into the combustion chamber of the boilers mixed with air.

The general principles of pulverized coal consist in crushing the coal and passing it over a magnetic separator to get rid of any iron particles. The crushed coal is then dried down to 1 to 2 per cent. moisture. The dry coal is then pulverized in ball-mills, the latest average practice as regards fineness being that 90 per cent. will pass through a 100 mesh, and 65 per cent. through a 200 mesh. The pulverized coal is conveyed through troughs to bunkers, and then to feeders which mix the coal with 10 per cent. of the air required for combustion and deliver it to the burners, in which 90 per cent. of the air, preheated to a high temperature, is then added. The result is an intensely hot flame of over 2,000° F. under the boilers,



Boiler Room Equipped with No. 4 Babcock & Wilcox Water Tube Boilers fitted to burn Pulverized Coal at No. 3 Fushun Power House with complete combustion, 17 to 18 per cent. CO_2, no CO, and entire absence of smoke.

The efficiency of the Fushun power plant has more than met the expectations of the engineers. Running with an average load factor of about 65 per cent. and using the poorest grade of coal, the fuel record for over a period of several months is 17,500 b.t.u. per hour with 250-lbs. boiler pressure and 200 deg. superheat. According to one of the highest American engineering authorities this constitutes a record not only in the Orient but in all Europe. In fact, he contends, it is nearly a world record for efficiency. He says it is the best run and best managed station he has seen and gives great praise to the engineers in charge, Mr. R. Ohashi and Mr. T. Matsumoto. The record, he adds, is double fine in view of the low grade of coal consumed which is almost twenty per cent. ash and worth about a yen per ton.

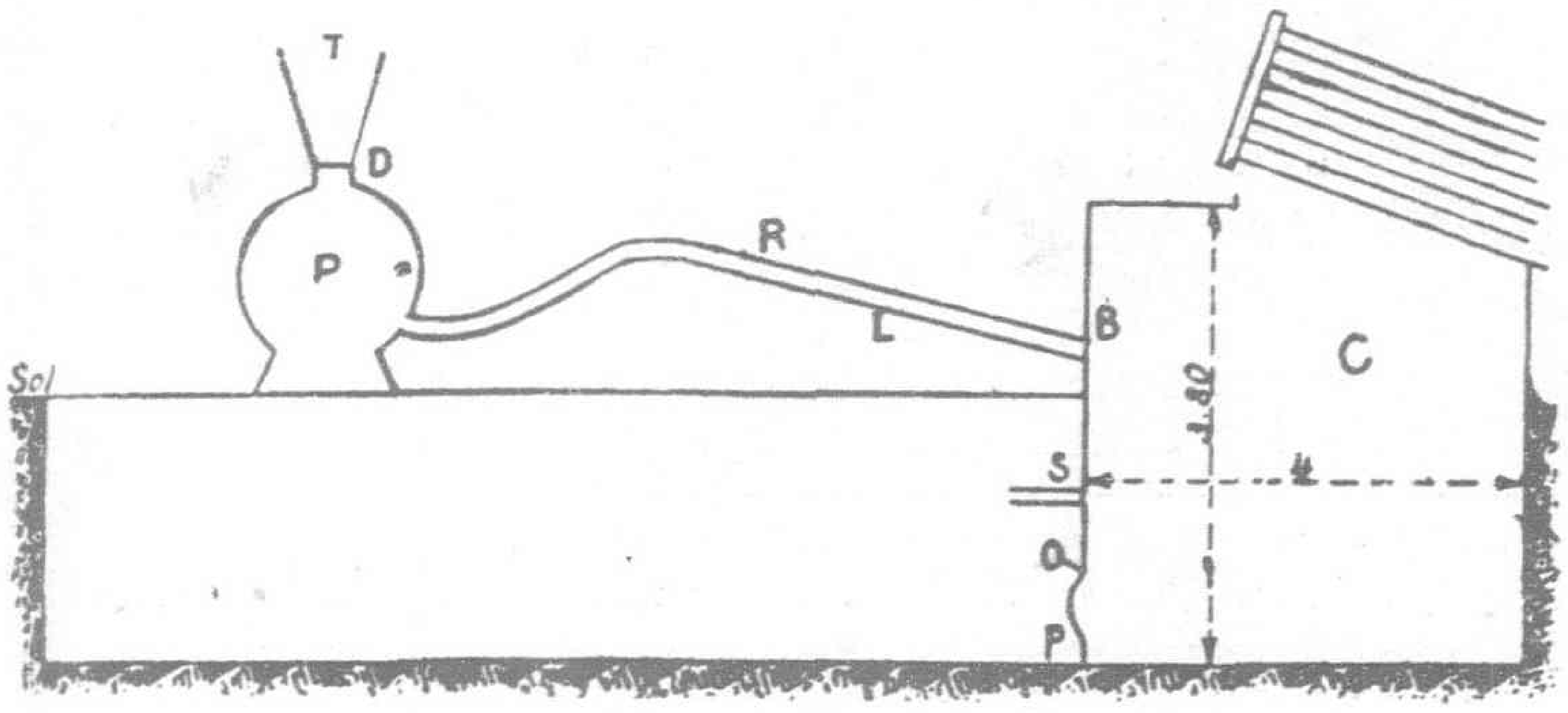
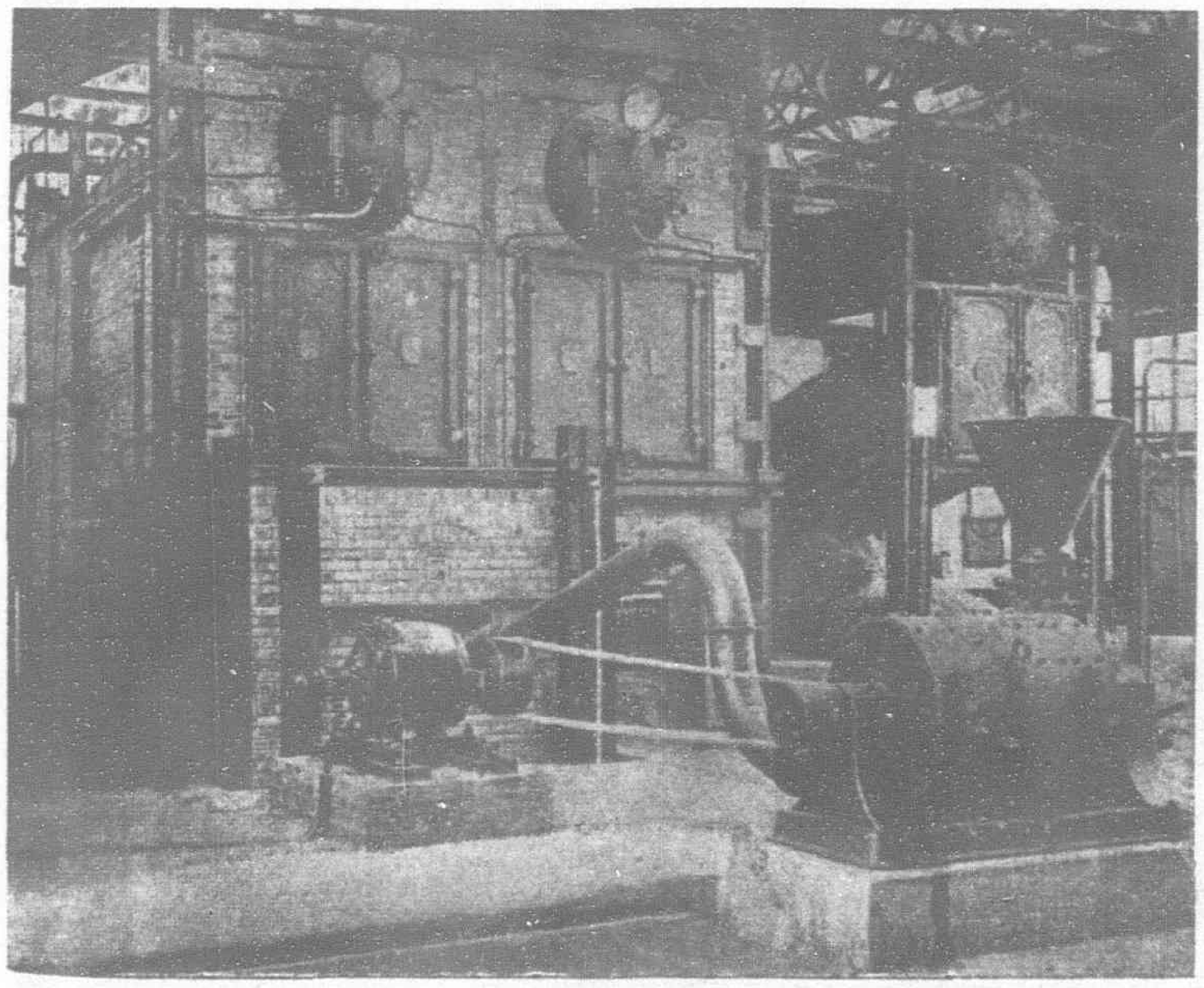


Diagram of Unit System

The success attending this plant induced the S.M.R. authorities to duplicate the order with the Holbeck Company for the power house at the Anshan Iron and Steel Works. This plant is now in process of erection and another plant is to be erected in connection with the Hamacho power house at Dairen also under the control of the S.M.R. It is possible, however, that in this plant another system will be installed.



Pulverizing Plant and Coaling Station for Locomotives

Although the results obtained at the Fushun power house constitute a wonderful efficiency record, it must be borne in mind that this applies only to low grade fuels which do not burn perfectly on a grate. It is yet to be scientifically demonstrated that the system is more efficient or economical where coals of British quality are used, but it is generally conceded that the pulverized coal plant in connection with steam plants at or near the mines and for cement and blast furnaces, is the most economical.

Cotton Mills and Raw Cotton Supply in Tientsin

(Continued from page 124.)

mow yields about 150 catties of raw cotton. The local market price is about $14.50 a picul (133⅓-lb.) of raw cotton, $45 for a picul of lint and $1.50 a picul of cotton seeds. Tung Ho cotton is moved from the producing districts to Sukochwang at a cost of 38 cents per picul, including the cost of packing. The railway freight from Sukochwang to Tientsin is $36.75, silver, a ton.

In recent years shipments of Turfan cotton produced in the neighborhood of Turfan, in Chinese Turkestan, have arrived in Tientsin. Before the European war, Turfan cotton was exported to Europe by the Trans-Siberian railway through Russian Turkestan. The yearly product of Turfan cotton is quite limited, but it is of good quality, being suitable for spinning yarn of fine counts.

The following figures show the quantity of raw cotton shipped to Tientsin from the interior districts, both under transit certificates and otherwise, during the four years ending 1922:—

	Piculs Under Transit Certificate.	Piculs Not Under Transit Certificate.	Total
1919 ..	576,064	72,453	648,517
1920 ..	351,332	35,625	385,957
1921 ..	589,840	45,442	635,282
1922 ..	862,533	81,633	944,166

Of the above figures, about 60 per cent. is Hsi Ho cotton and 20 per cent. Yu Ho. This is a rough estimate, as the native customs keep no classified statistics. September, October and November are the busiest cotton trade seasons on the Tientsin market, although considerable business is done in March, April and May.

The figures of raw cotton exported from Tientsin to foreign markets, including the consignments transhipped to other Chinese ports during the past eight years ending 1922 are: 1915, 444,732 piculs; 1916, 282,499 piculs; 1917, 158,192 piculs; 1918, 327,609 piculs; 1919, 530,881 piculs; 1920, 258,568 piculs; 1921, 454,898 piculs; 1922, 548,963 piculs.

Of the 548,963 piculs exported in 1922, 70,885 piculs went to other Chinese ports, 353,213 piculs to Japan, 104,828 piculs to the United States, 9,688 piculs to Great Britain, 6,196 piculs to Germany, 1,153 piculs to Italy, 1,061 piculs to France, 857 piculs to Korea, 369 piculs to Denmark, 303 piculs to Hongkong, 241 piculs to Portugal and 169 piculs to Holland.

Tientsin imports quantities of raw cotton of both native and foreign origin, as is shown by the following figures. The bulk of the native cotton comes from Shanghai.

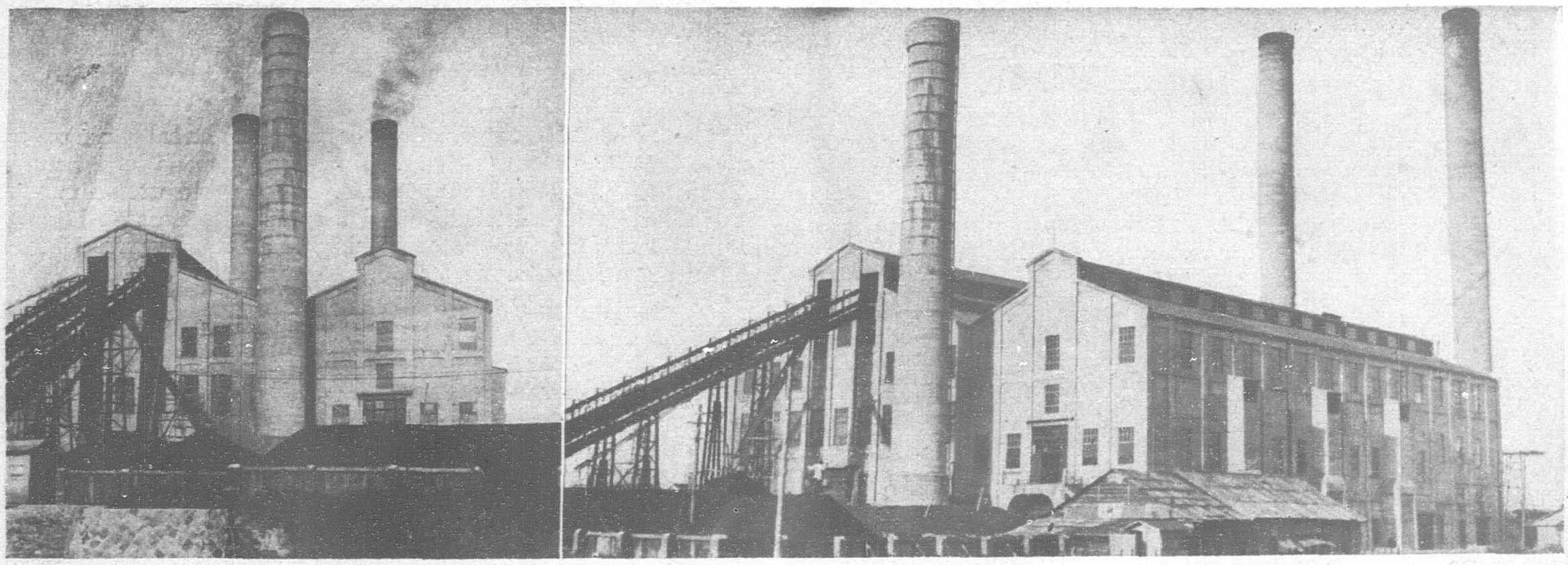
NATIVE FIBRE.

	Piculs Imported.	Piculs Re-exported.	Net No. of Piculs Imported.
1919	20	—	20
1920	3,816	1,146	2,670
1921	18,197	—	18,197
1922	11,491	—	11,491

FOREIGN FIBRE.

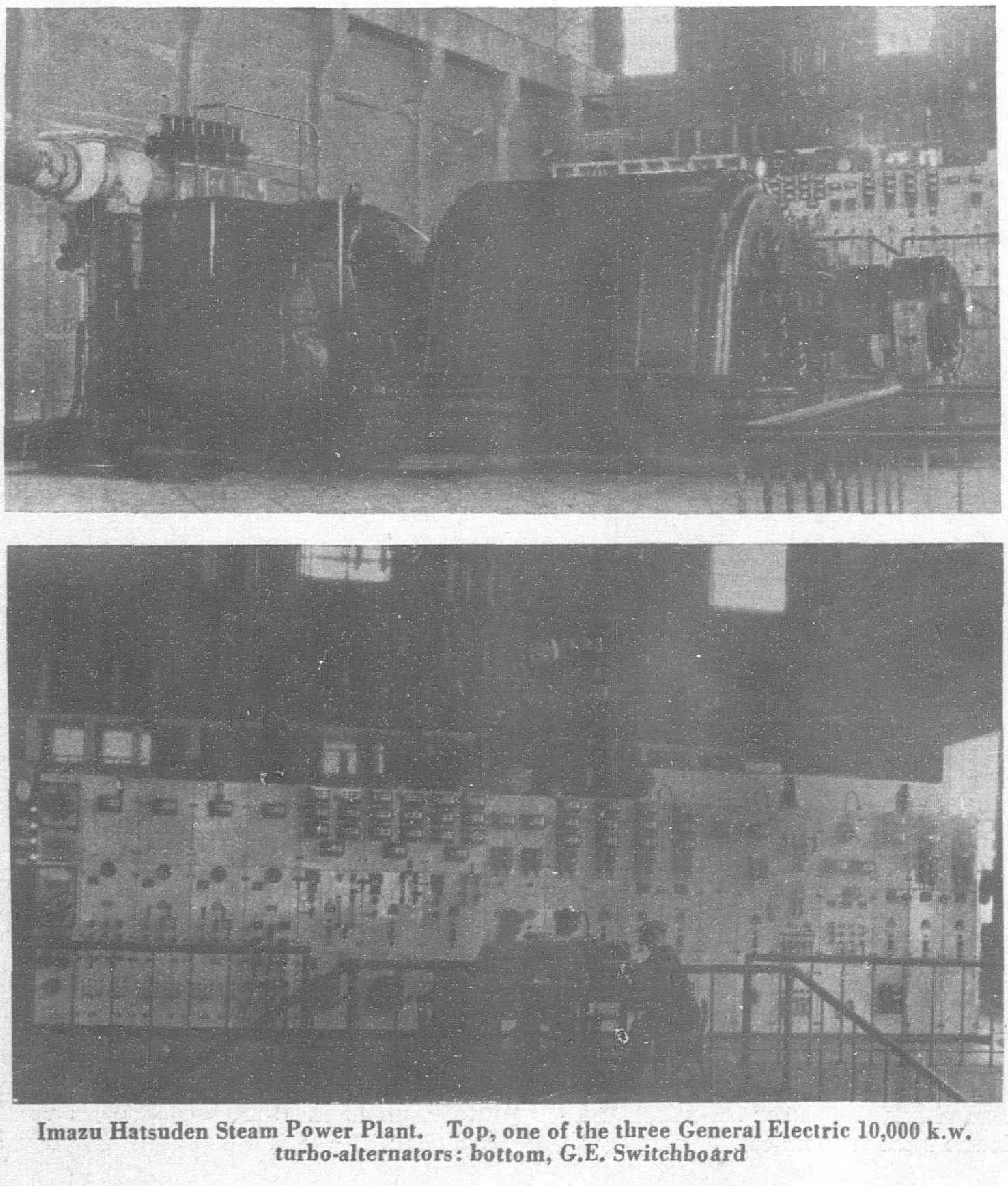
	Piculs Imported Directly from Foreign Countries.	Piculs Imported via Other China Ports.	Total.
1919	1,548	—	1,548
1920	5,992	8,353	14,345
1921	65,403	64,773	130,176
1922	101,979	61,818	163,797

The bulk of the foreign cotton comes from India, although the United States contributes some. Of the 163,797 piculs imported into Tientsin in 1922, 40,564 bales were Indian and 9,684 bales American.



Steam Plant of the Imazu Hatsuden Kaisha. Power of the Hanshin Express Electric Railway is furnished by its sister company, the Imazu Hatsuden Kabushiki Kaisha, from its steam power plant near Nishinomiya, equipped throughout with General Electric machinery and material

Notes on the Hanshin Express Electric Railway.—Kobe-Osaka



Imazu Hatsuden Steam Power Plant. Top, one of the three General Electric 10,000 k.w. turbo-alternators: bottom, G.E. Switchboard

ONE of the most important electric traction developments in Japan is seen in the rapid growth of the lines controlled by the Hanshin Electric railway serving the territory between Osaka and Kobe. Starting in 1903 with a line between Osaka and Takaradzuka, the new rapid transit service materially contributed towards building up the thinly populated surburban districts into prosperous towns and municipalities. From the main line various branches have since been built linking together practically all the principal towns in the district. The main line provides transportation between Osaka and Minono Park, famous for its scenic beauties and maple trees and the hot springs at Takaradzuka, equally famous as a health resort and the source of Tansan water.

Here the Hanshin Electric railway company built the Takaradzuka opera house with a seating capacity of 4,000 and in other ways improved the place as a holiday resort for the workers of Osaka. From here the line was to have been extended to Arima, another famous hot spring resort but excessive grades and heavy tunelling compelled the abandonment of the scheme.

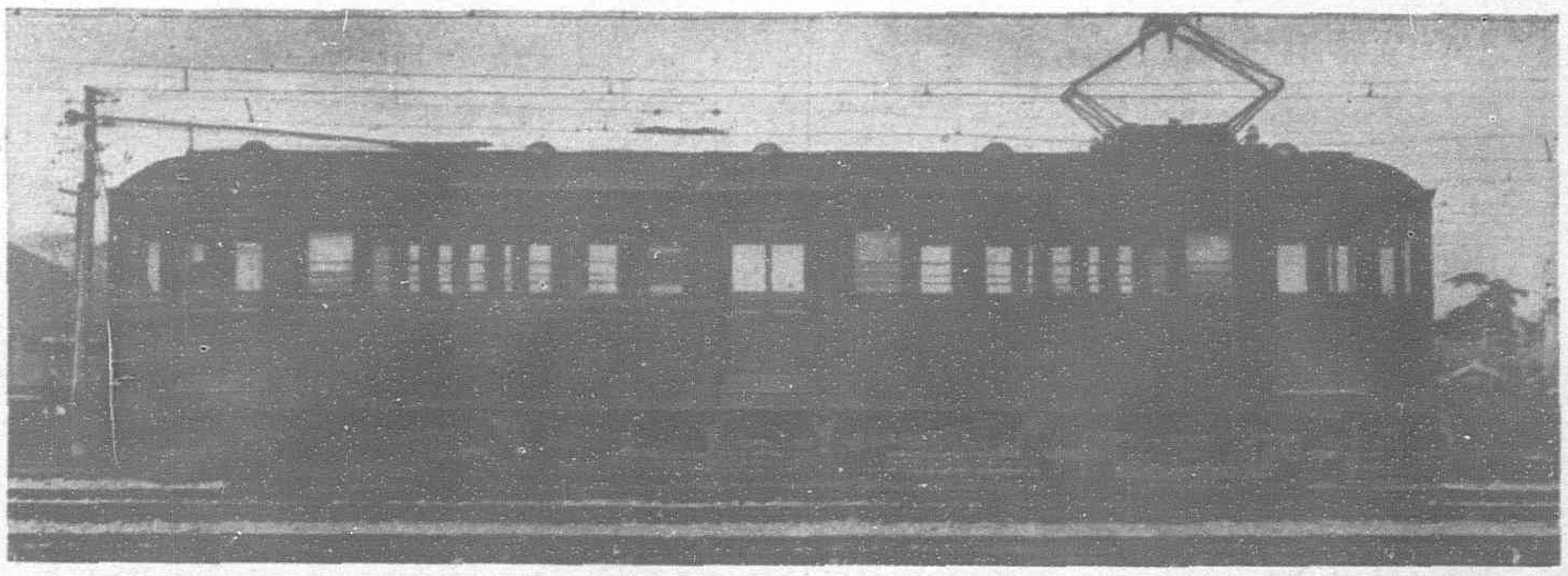
From this main line several branches and extensions were built, until in 1920 the company completed the construction of a through line into Kobe and inaugurated an express service between the post and the manufacturing centre of Japan. The system as it now stands embraces the following lines:—

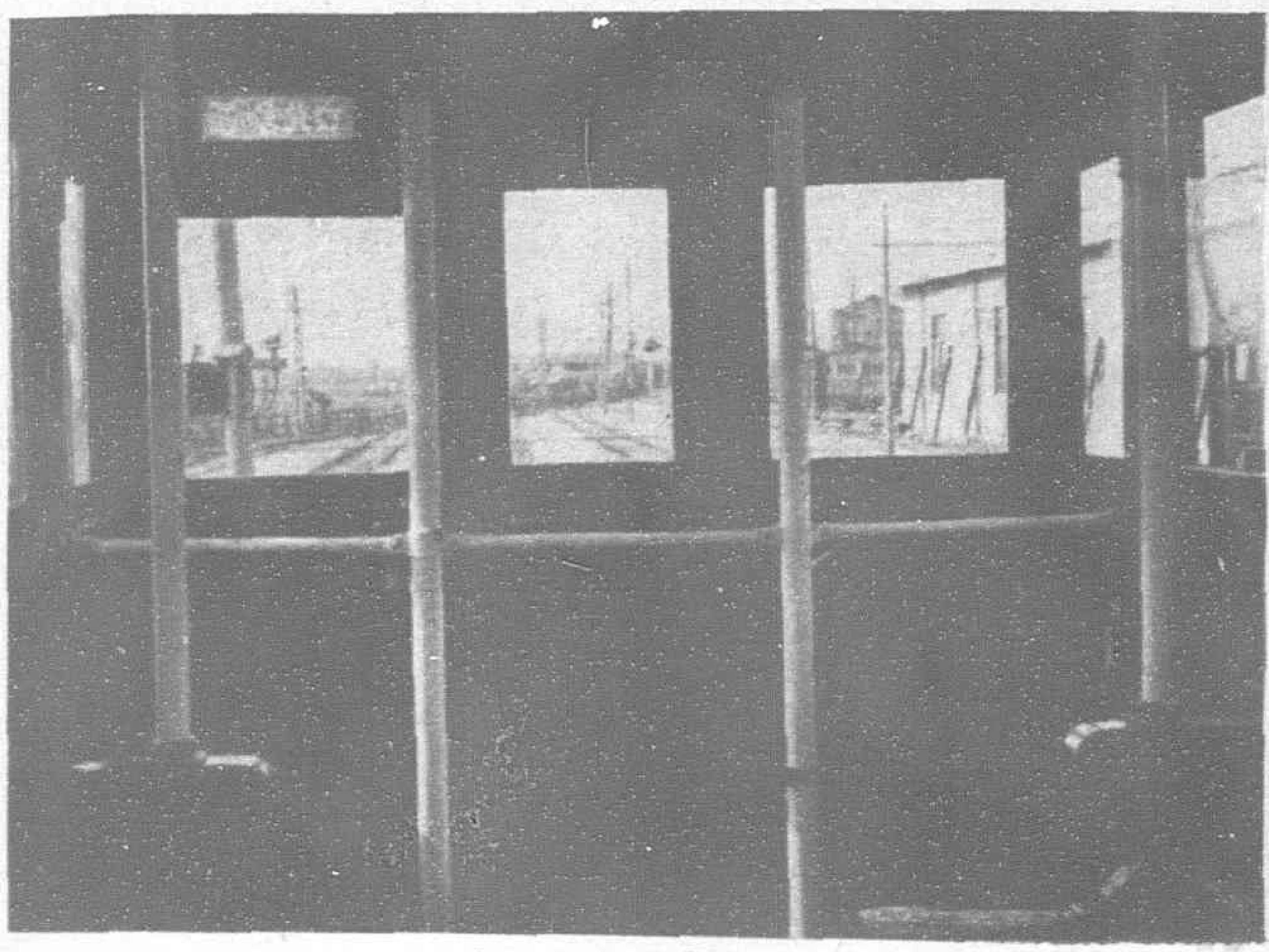
1. Osaka-Kobe, 18 miles double track
2. Osaka-Takaradzuka, 15.5 miles double track
3. Nishinomiya-Takaradzuka, 4.8 miles double track
4. Tsukaguchi-Itami, 1.5 miles single track
5. Ishibashi-Minono, 2.8 miles single track

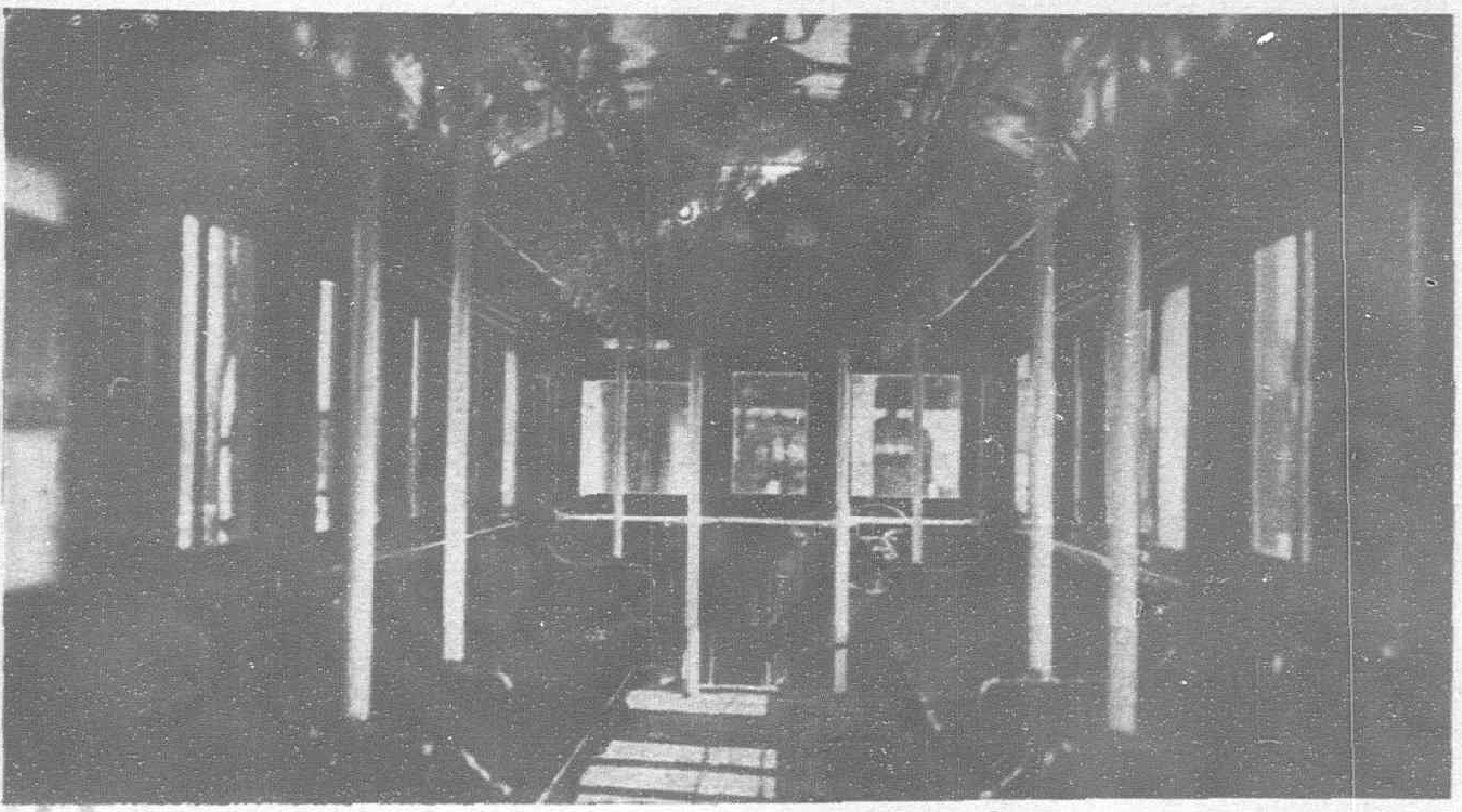
6. Shukugawa - Kyoen, 1.4 miles single track

Total, 44 miles double and single tracks.

The company now plans to extend its service from Nichinomiya to Imaza, Tsukaguchi to Amajasaki and to Takaradzuka from Itami.


New Interurban Cars for the Hanshin Express Electric Railway Semi-Steel Construction

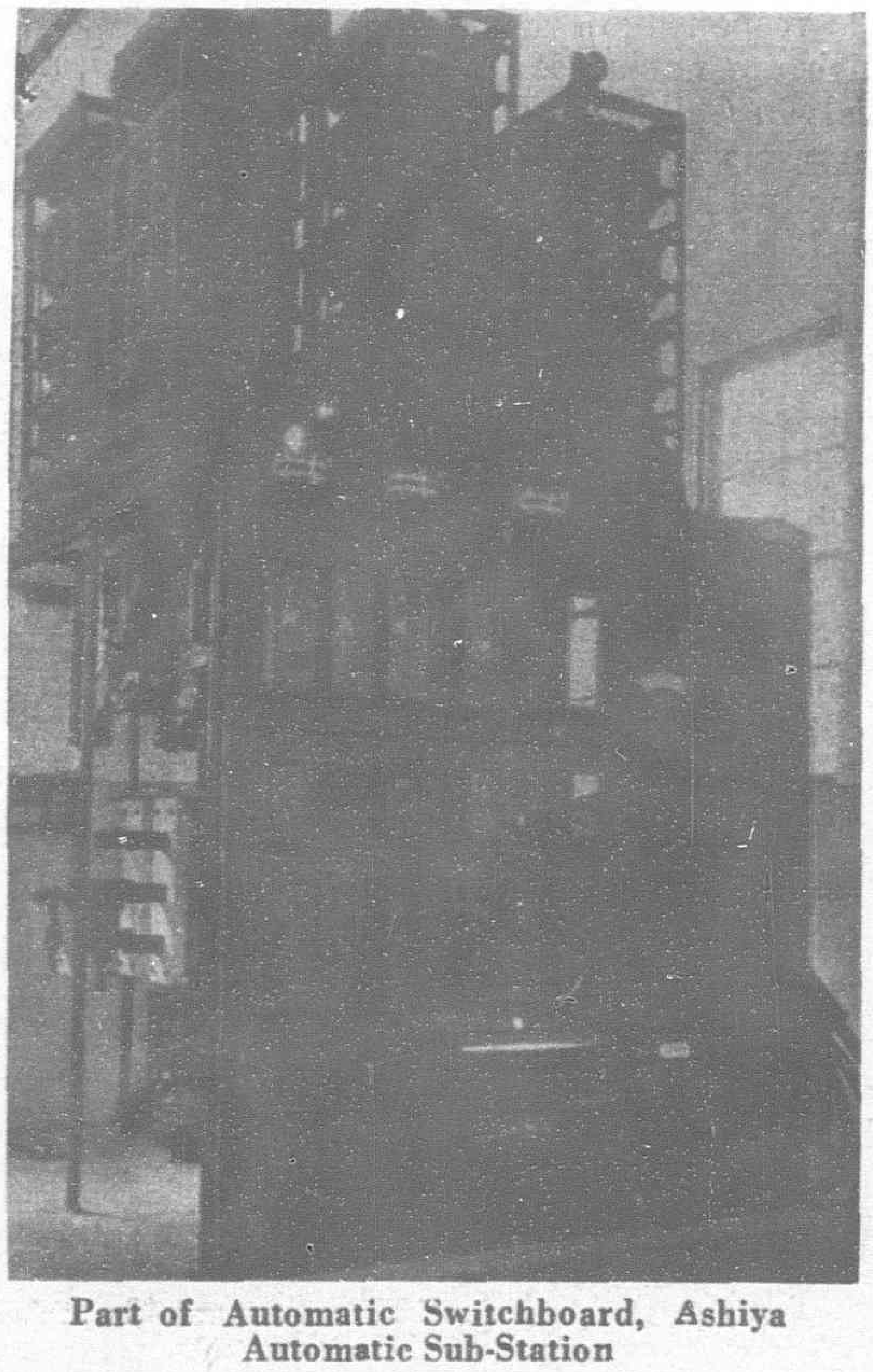

Operating Cab

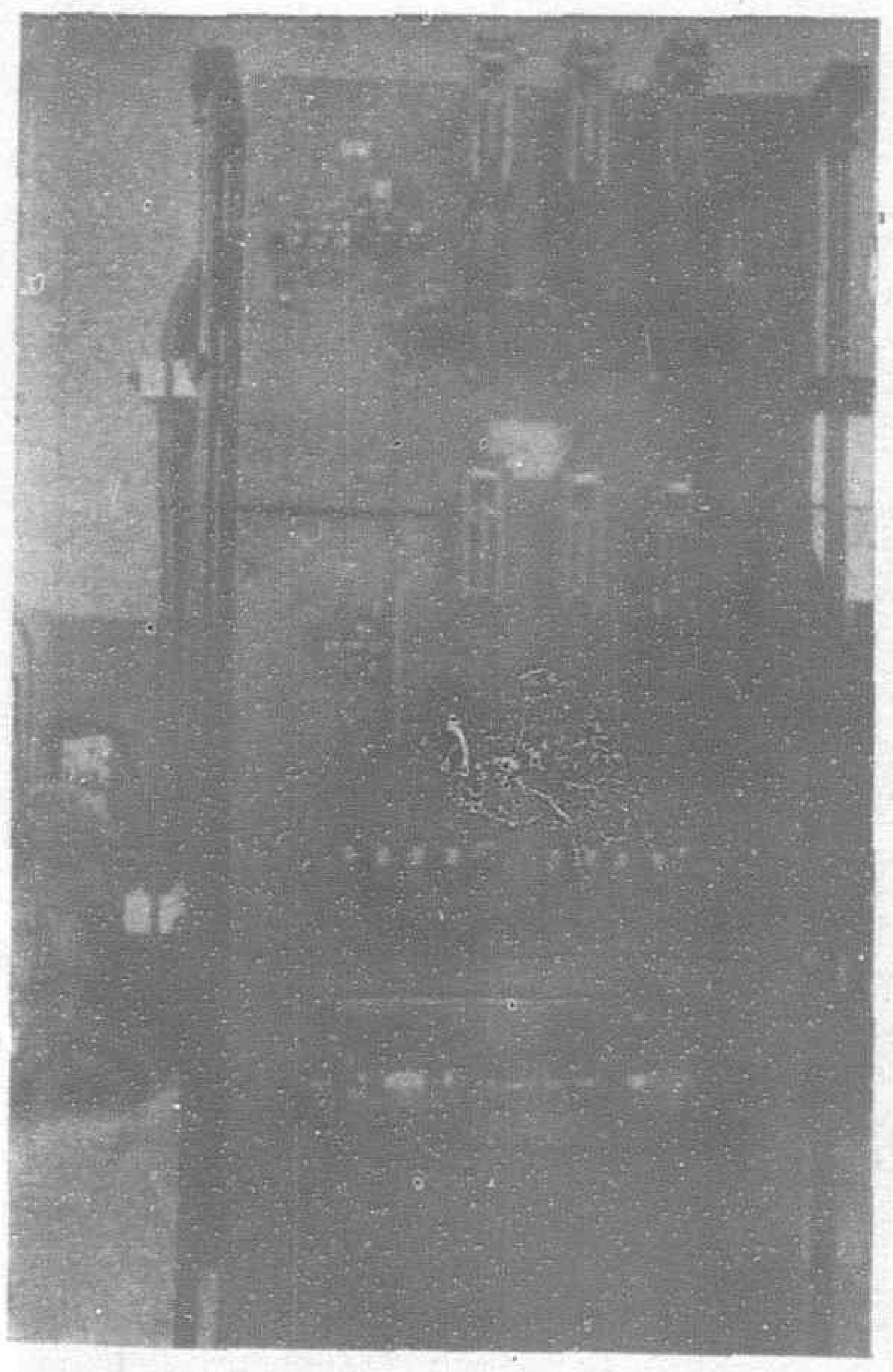

Interior of New Semi-Steel Interurban Cars

Practically all its electrical equipment has been furnished by the General Electric Company.

The power for operating the line is received from the steam generating station of the Imazu Power Generating Company equipped with three 10,000 k.w. General Electric turbo-alternating sets delivering current at 22,000 volts. The six substations are also all furnished with General Electric equipment. They are located as follows:

Kanzaki-gawa	3—1,000	k.w. converters.
Nishinomiya ..	2—	,, and 3—500 k.w.
Ishibashi ..	2—	,,
Takarazuka ..	3— 500	,,
Ashiya.. ..	1—1,000	,, full automatic.
Rokko.. ..	1—1,000	,, and 2—500 k.w.


Part of Automatic Switchboard, Ashiya Automatic Sub-Station


Master Controller Panel

The Osaka-Kobe express service is operated on a schedule speed of 28.2 miles per hour and 20.7 miles on the Takaradzuka line, with a headway of four to ten minutes between train. The present service is of single and double cars, which is to be extended to three car trains in the near future. The motor car equipment is as follows:

33 cars G.E.—90-B 4 motor, MK control and G.E. air brakes.

36 cars G.E.—263 motor, PC control and G.E. air brakes.

10 cars G.E.—240 motor, control and G.E. air brakes.

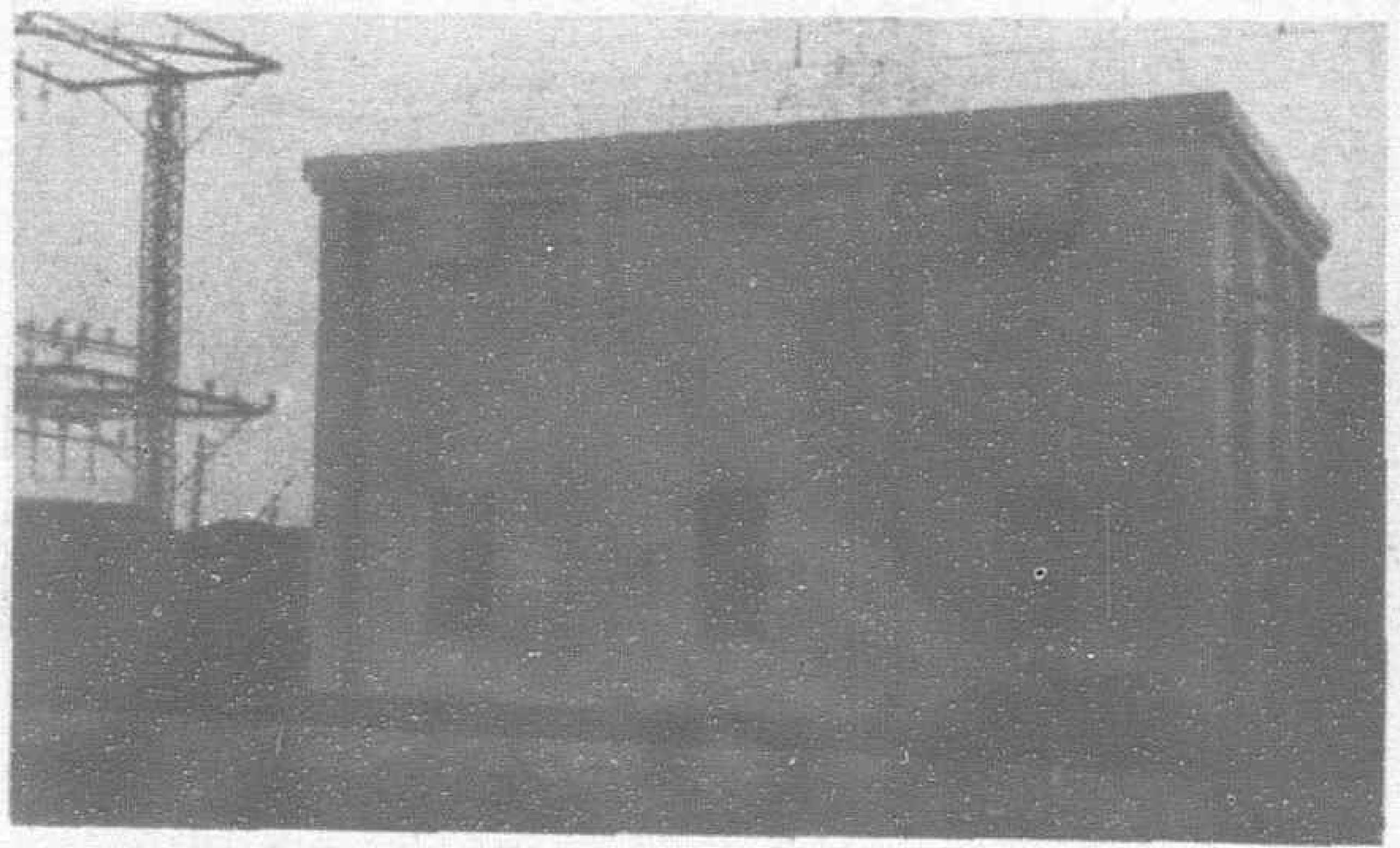
11 cars G.E.—203-P 2 motor, K control and G.E. air brakes.

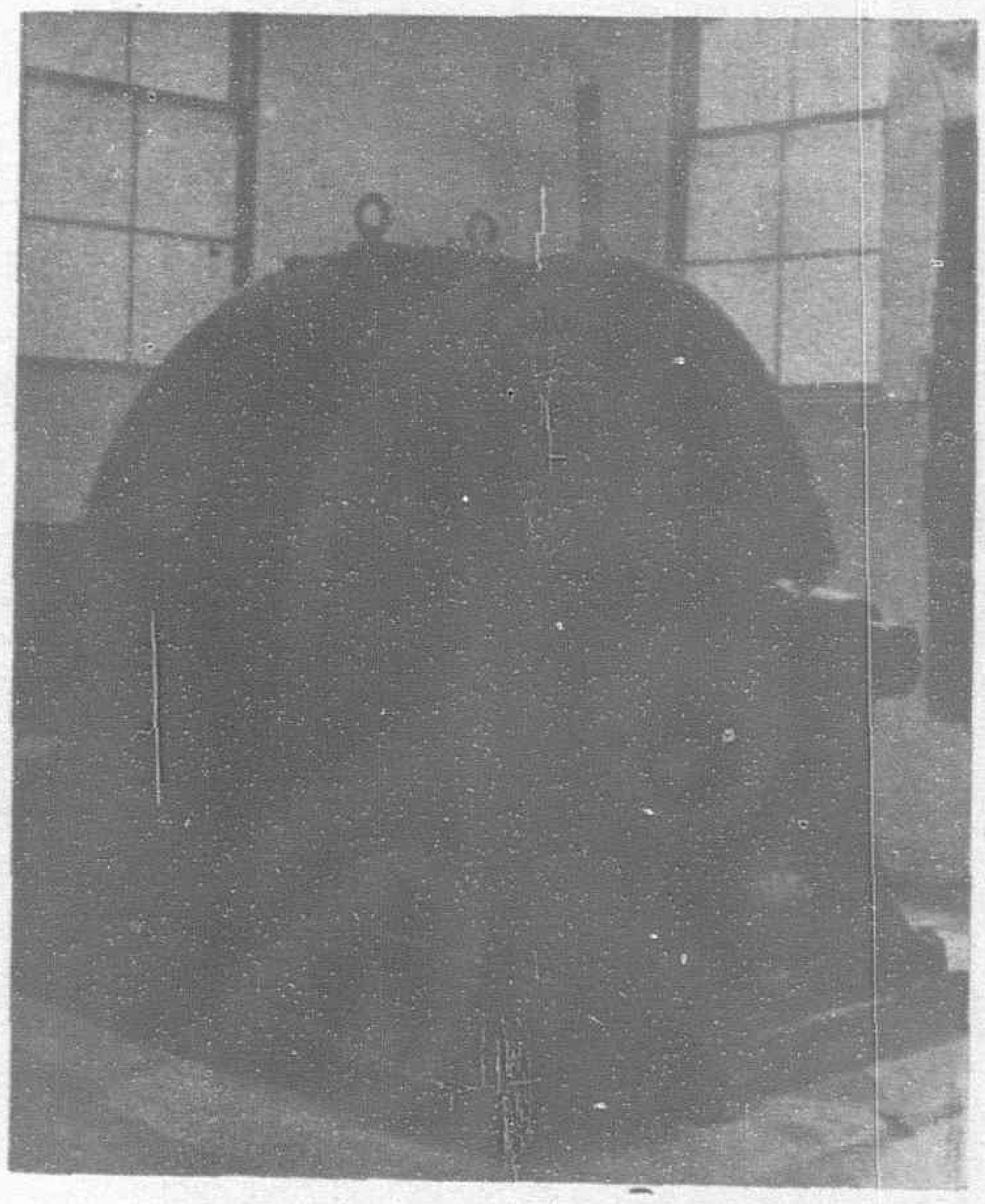
12 trailers now under construction.

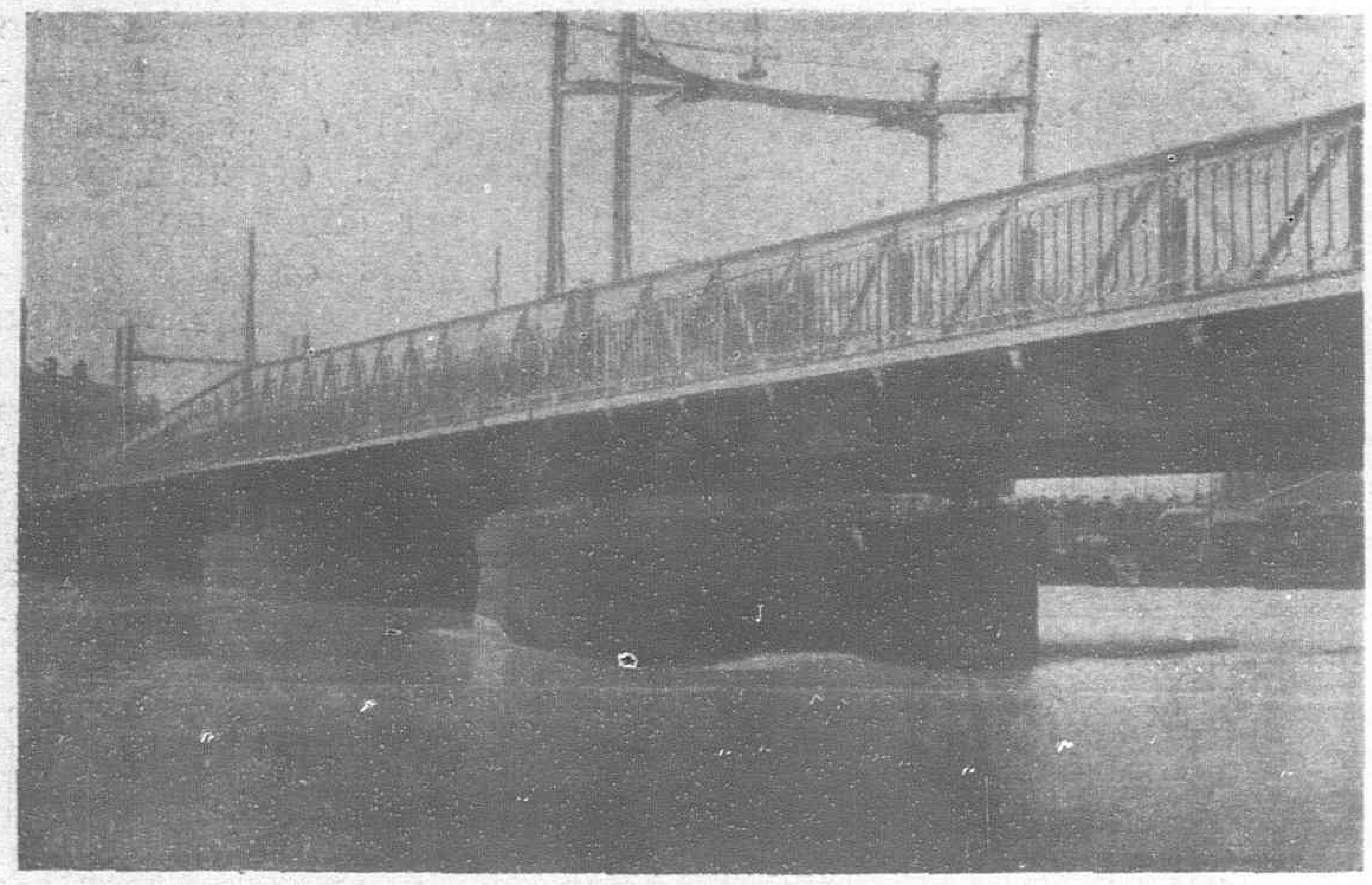
15 freight cars—G.E. 260 or 90-B or 203-P with PC or K or B control. (Three types used).

12 sets Baldwin trucks, remainder Brill.

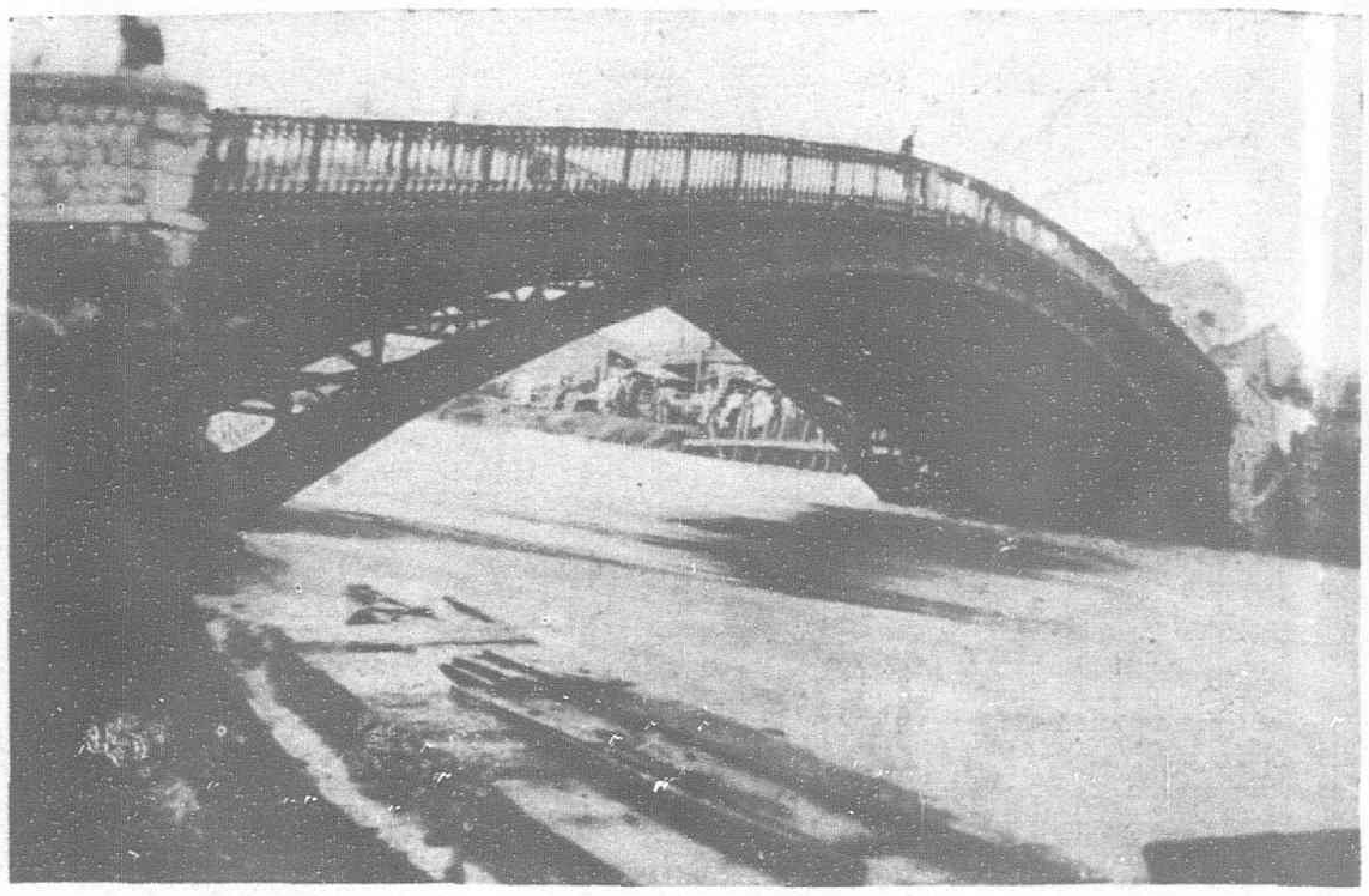
The subscribed capital of the company is Yen 30,000,000 of which Yen 24,000,000 is paid up. For the past two terms a 12 per cent. dividend has been paid.


Automatic Sub-Station at Ashiya Exterior


1,000 k.w. Synchronous Converter



The Hung Chiao Red Bridge, now at the bottom of the Hai Ho



The International Bridge—To be Replaced by a New Bridge

A Year in Tientsin

Flood, Famine and Prosperity Mingle in Northern Metropolis

IN spite of floods and famine and the depredations of the soldiers, Tientsin continues to develop industrially. The following notes give but a slight indication of the prosperity of this growing city.

Tientsin is the distributing centre for the northern provinces of China, it is the key to Peking with which there is connection by rail, and the Grand Canal is responsible for the transportation of native goods to places which are not accessible by rail. In favorable years the yield of cereals in Chihli province is large, but owing to the flood menace during the summer of 1924 the crops of the locality were destroyed ; the flood which threatened Tientsin during the months of July, August and September, caused the inundation of several districts in the interior, with the result that much of the farm produce such as ground-nuts, cereals, etc., could not be taken to the market at all. Goods such as skins, wool, etc., could not be brought to town, villages were submerged, communication was entirely interrupted ; the roads were like rivers, bridges were carried away by the flood, and only small quantities of goods could be sent in by the aid of boats.

The force of water broke away parts of the embankments, which served as roads, the water rushed in and destroyed the crops ; several miles of land were under water, nothing was visible on the surface but the tops of the trees, and when the flood abated the trees were all that was left on the fields.

When the flood menace ceased in September, the local war started. Railway cars were commandeered by the military for army use ; soldiers, houses, and war-material were rushed to Peking, from there to Shanhaikwan, and the trade of Tientsin suffered from political unrest, war and flood.

800,000 acres are planted with cotton in the province of Chihli, and 130,000 in Shansi, yielding 242,000,000 and 33,000,000 pounds of cotton respectively, but 50 per cent. of the Chihli cotton is not expected to materialize this year ; all Chinese-grown cotton is poor in quality, and unfit for manufacture of fine grade yarn, and foreign cotton is imported for the purpose of mixing with the local product.

A good quantity of wheat of an inferior quality is produced in Chihli. This arrives from the country in a dirty condition, which is due to the fact that it is threshed on floors made of mud, most of it is ground in local flour mills, and used for native consumption.

Perhaps the peanut trade suffered more from flood than any other industry; the whole of the Chihli province is noted for peanuts. The best quality of peanuts are grown in the locality of Lanchow, the nuts produced there have thin white husks, which are in great demand in the American market. Almost every Chihli farmer has a portion of his ground allotted for peanuts, no parts of these nuts are thrown away or wasted ; the creepers on which the nuts grow are used for fuel, the kernel is a valuable article of food, no Chinese dinner being complete without peanuts, either roasted or salted, and the husk, which ignites quickly, is used for starting fires.

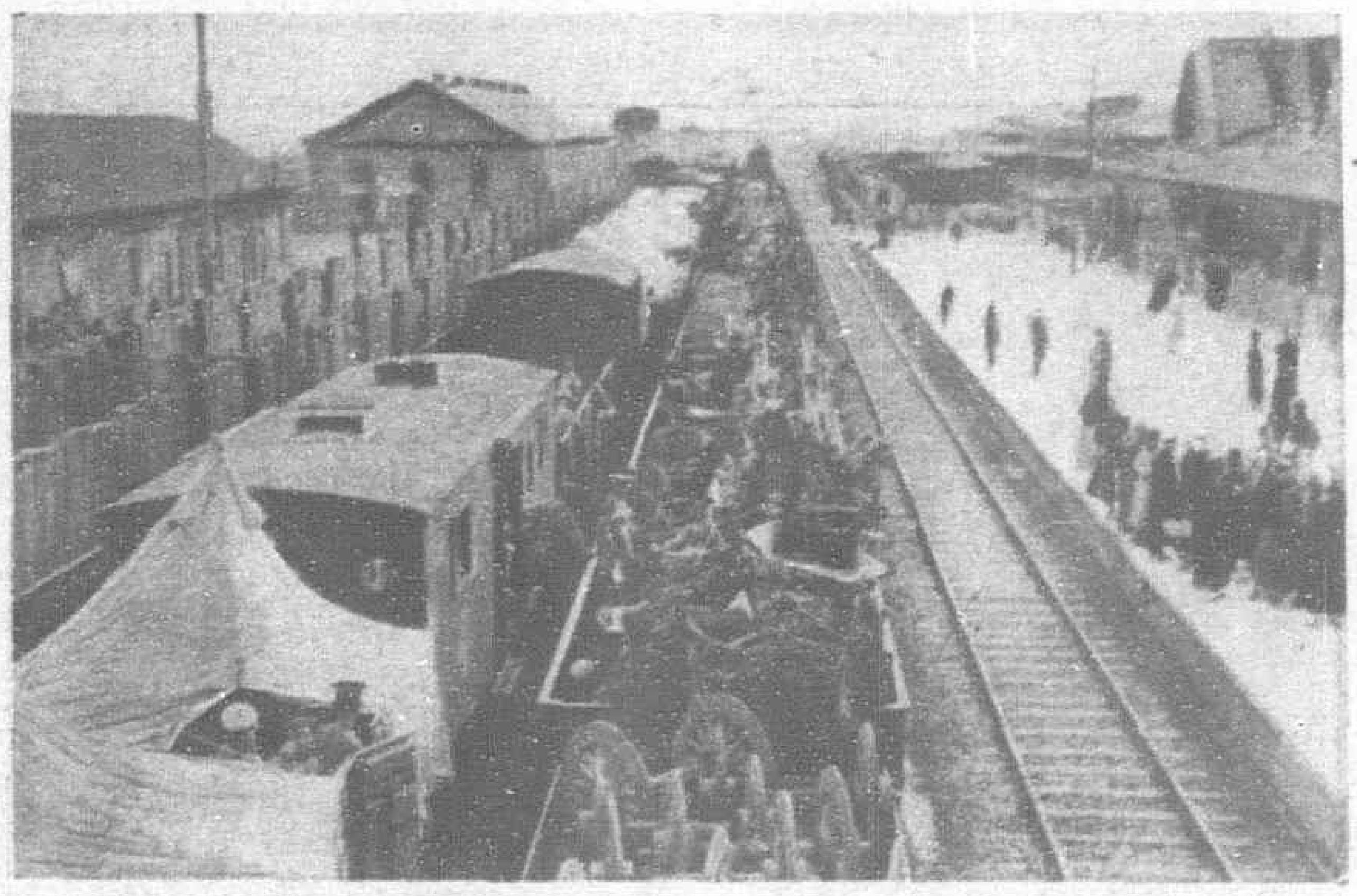
When peanuts arrive in Tientsin from the country, several thousand women and children are employed in picking and sorting them ; the first quality (about 30 to the ounce) is usually sent to the United States, the second and third qualities are also exported abroad, and the nuts which are not fit for exportation yield a fine amber-colored oil.

Shantung is also a large peanut-producing province. The oil is pressed and sent to Tientsin, where it is cleaned or refined and repacked into barrels for exportation to London ; after the oil is pressed from the nut, the residue left over is made into round cakes and used as a fertilizar. Many merchants are engaged in the peanut business, walnuts and peanuts both shelled and unshelled, form some of the most important articles of the Tientsin export trade.

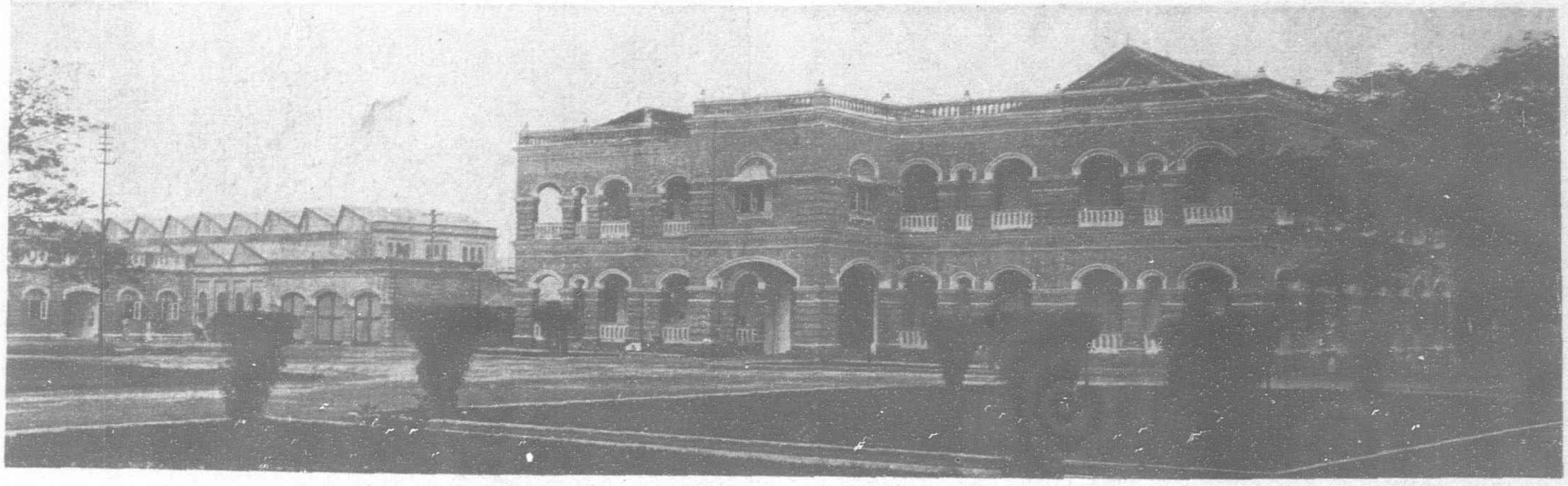
Owing to the shortage of wool, which could not be sent to town during the summer, the carpet-making industry was curtailed, these carpets command a high price in foreign markets, and are exported in large quantities to the United States ; there are some local carpet factories, but those exported are chiefly made in small native work-shops.

A new factory for the purpose of making glass and crockeryware has recently been erected in Chingwantao ; the capital for this plant was invested by Belgiums and Chinese, and the business is controlled by the Kailan Mining Administration, whose building on Meadows Road is a large institution. The word Kailan was derived from Kaiping and Lanch'ow formerly the names of two coal mines, which were amalgamated.

At the corner of Bruce and Devonport Roads Messrs. Elbrook & Co. (*Hai-Ching-Kung-Si*) have started a dyeing and spinning factory, which is equipped with the latest spinning machinery. There are two large spinning mules containing 390 spindles each ; this plant can dye from 1,000 to 1,300 pounds per day in fast colors.



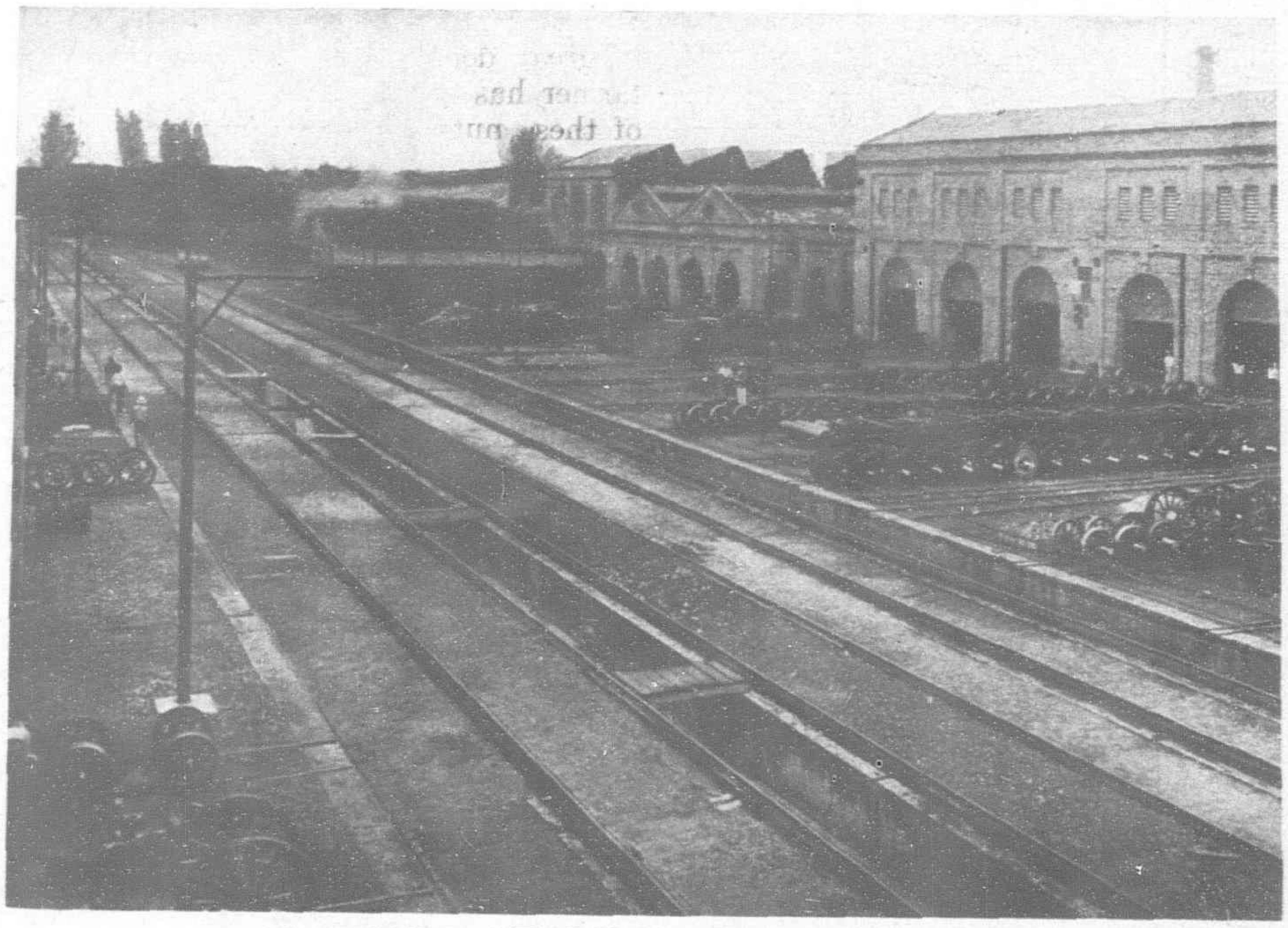
Troop Trains at the Tientsin Station



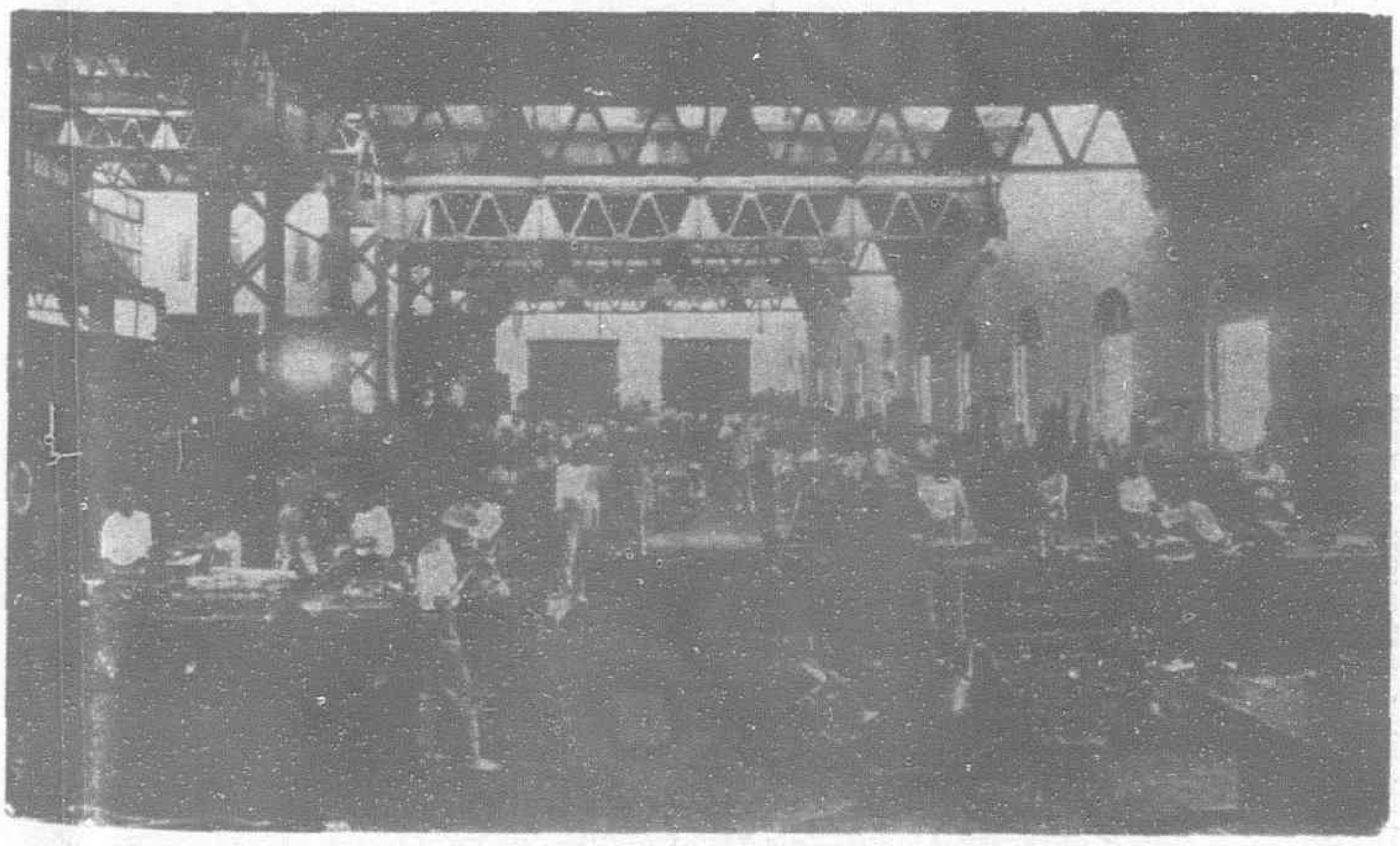
Locomotive Department Offices of the Central Workshops of the F.M.S. Railways at Sentul

Central Workshops of the F.M.S. Railways

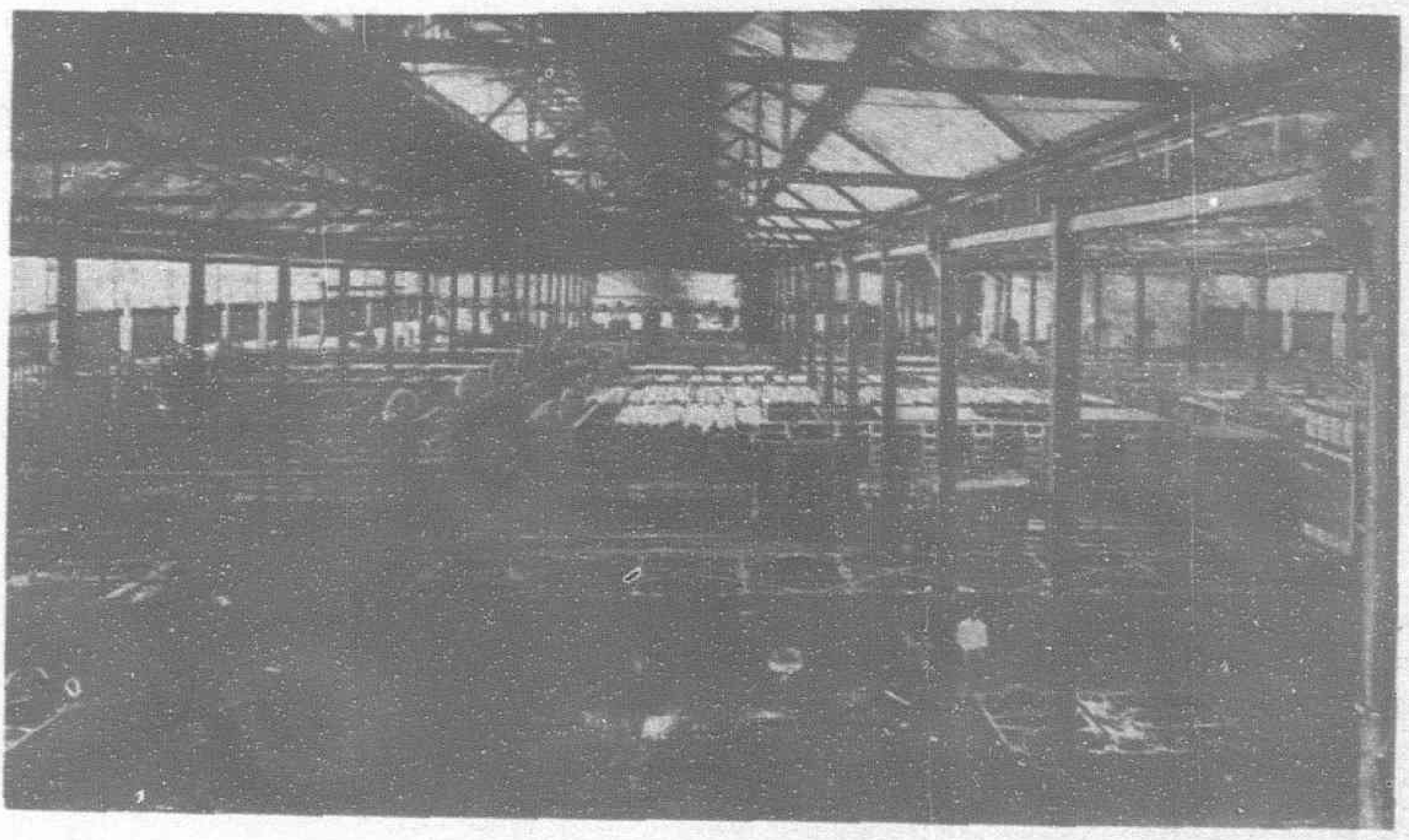
THE central workshops of the Federated Malay States railways are situated at Sentul, 3 miles from Kuala Lumpur, the central point of the railway system. In the year 1904 the federation of four of the protected Malay States led to a combination of the various railway systems and to the construction of modern workshops for the unified undertakings. Since that date the shops have expanded in accordance with the requirements of a rapidly growing railway and are to-day capable of keeping in proper working condition, an equipment consisting of 252 locomotives, 4 rails motor cars, 598 coaching vehicles and 5,872 wagons. Access to the shops is from the branch line leading from Kuala Lumpur to Batu caves and it will be noticed from the illustration that the works are divided into two parts by a traverser the table of which is 60 feet long and capable of taking the longest vehicles on service. To the south of the traverser are the erecting and machine shops, the foundry and locomotive stores, while on the north side lie the carriage and wagon shops, the saw mill and the boiler and smith shops. The erecting shop is 603-ft. long, in the centre of which are 3 pit roads spanned by two overhead cranes each of 20 tons capacity. On one side are the fitting benches for motion, rods, axle boxes, etc., and outside there is a boiler which supplies steam for the "bosh" as well as for testing injectors, etc. One end of this bay is set aside for the mill wrights. On the other side of the erecting shop is the machine shop 603-ft. long by 40-ft. wide. The machinery installed is of general utility and is all electrically driven. A monorail crane serves the wheel lathes and other machines taking heavy work. The last extension of these shops was in re-inforced concrete and an upper storey is provided, where an electrical shop is now situated. A similar gallery over the machine shop is provided



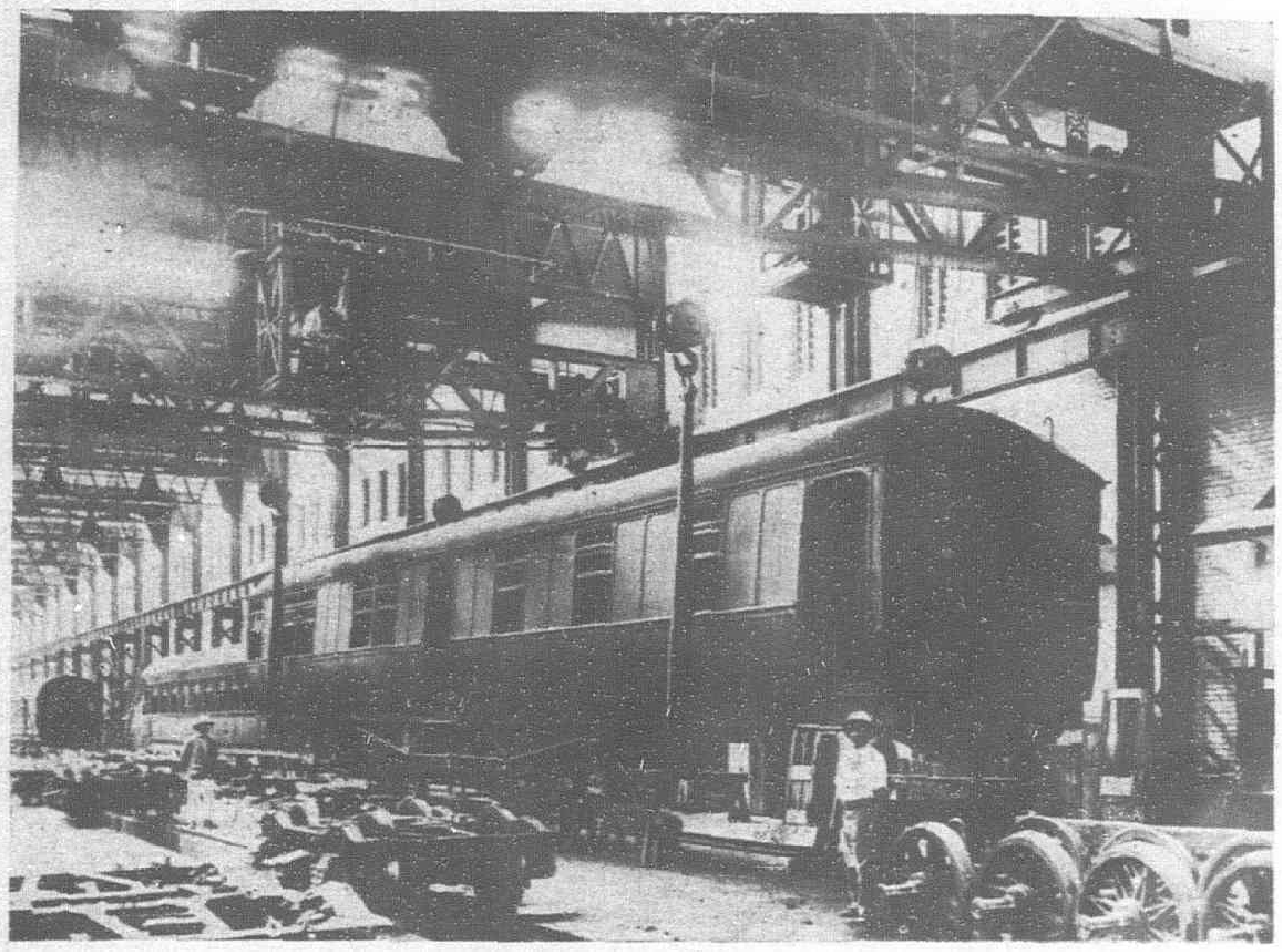
General View of Workshops Looking Down Traverser

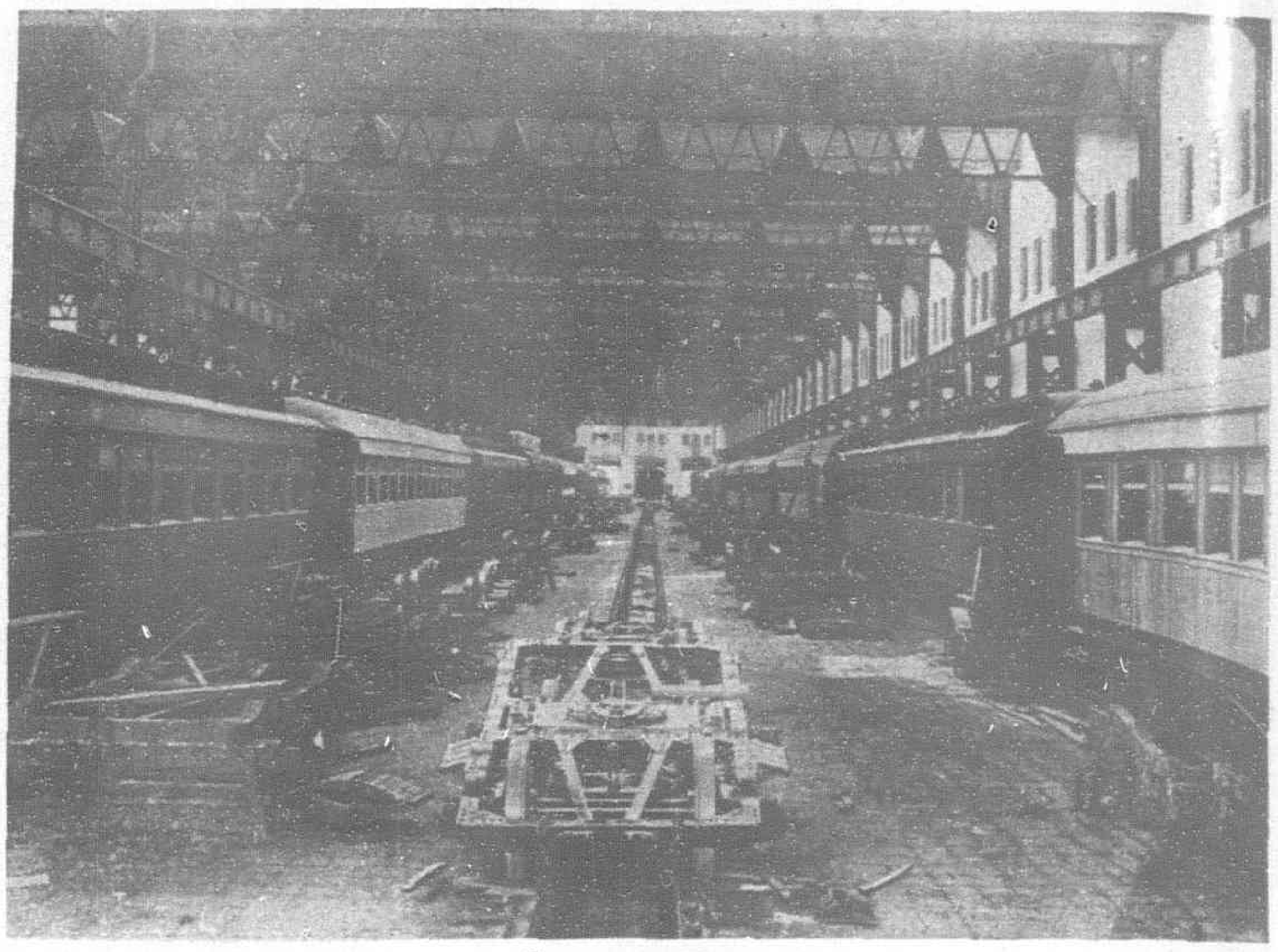


Fitters Benches in the Erecting Shop

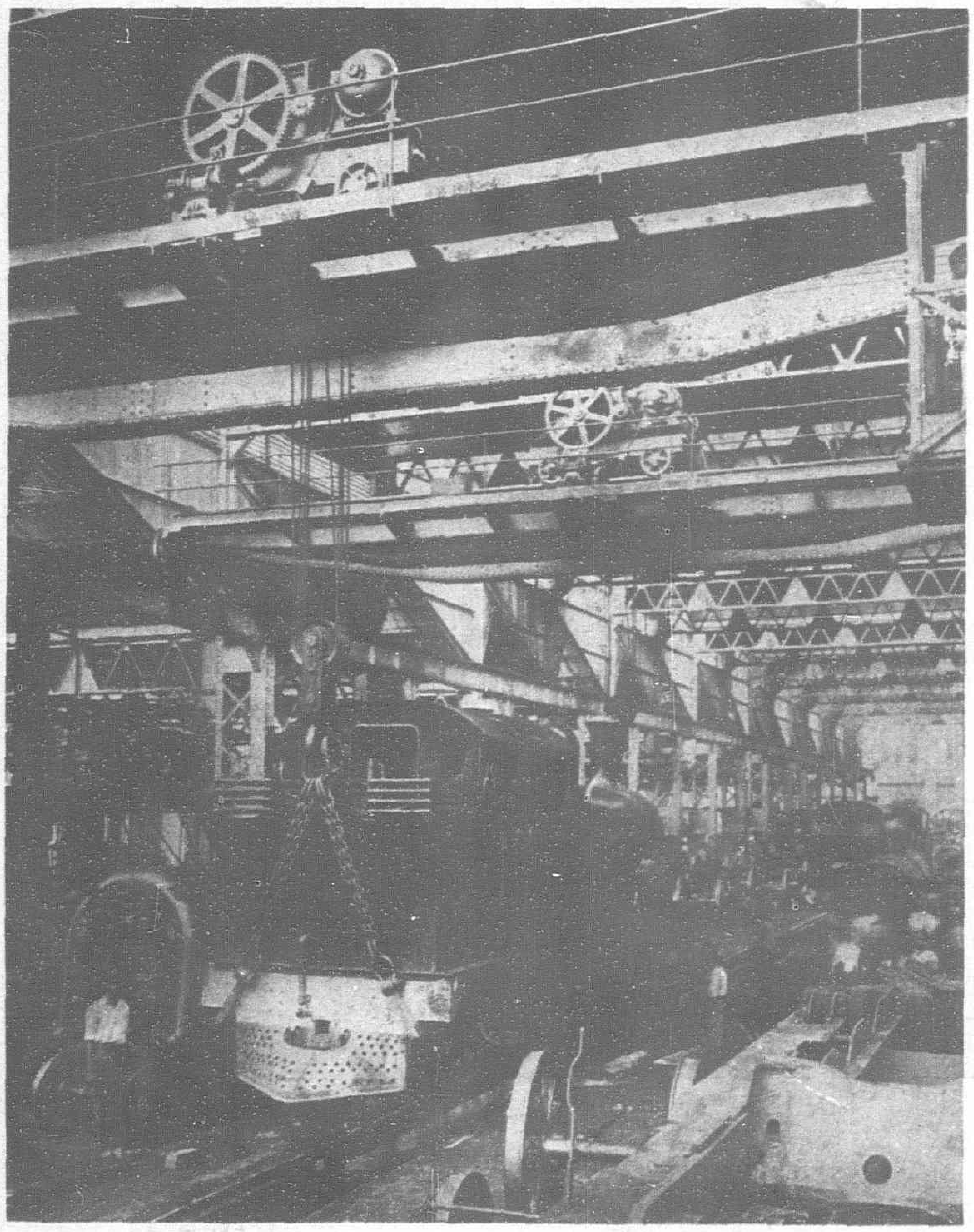


Carriage Body Binding

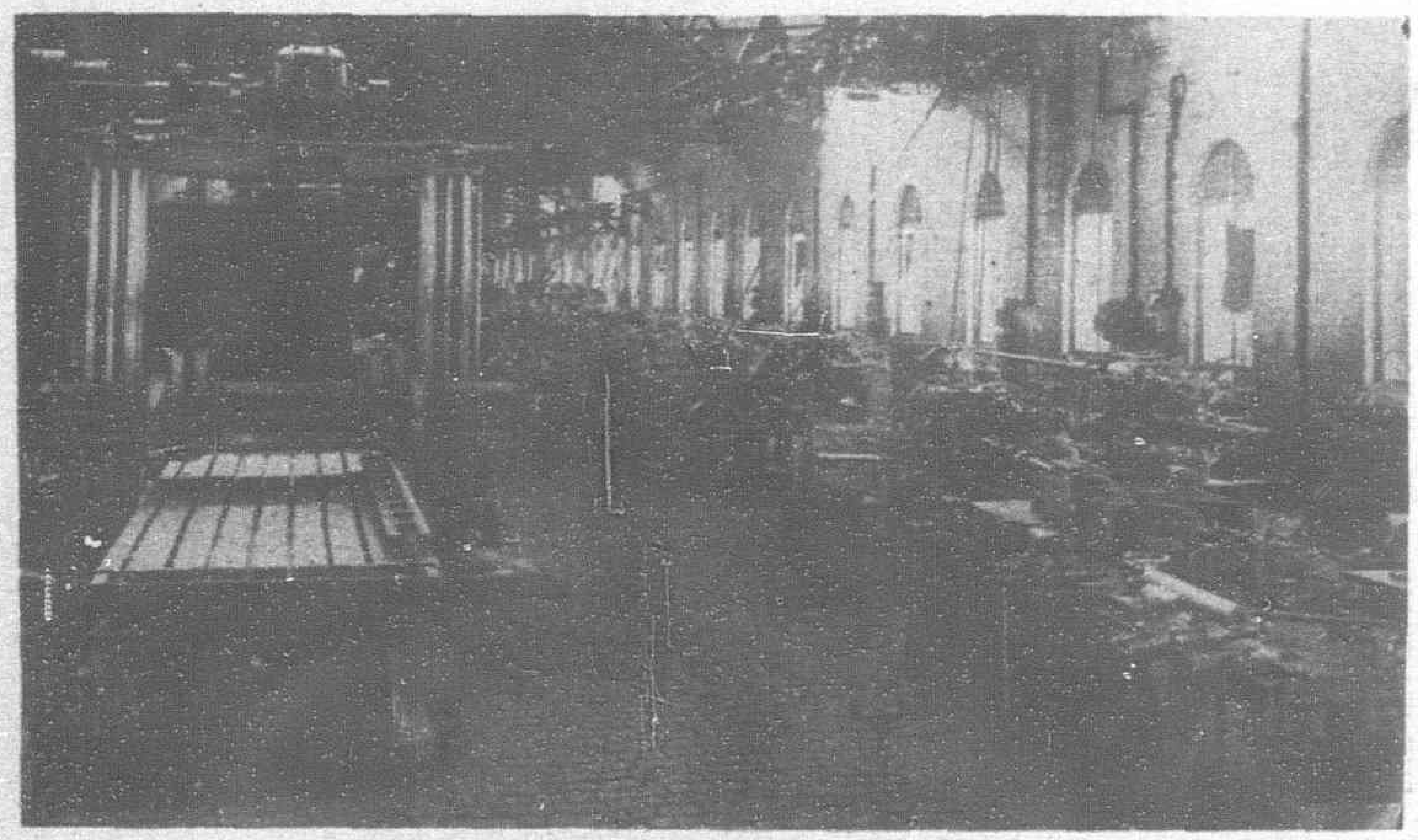

Carriage Shop

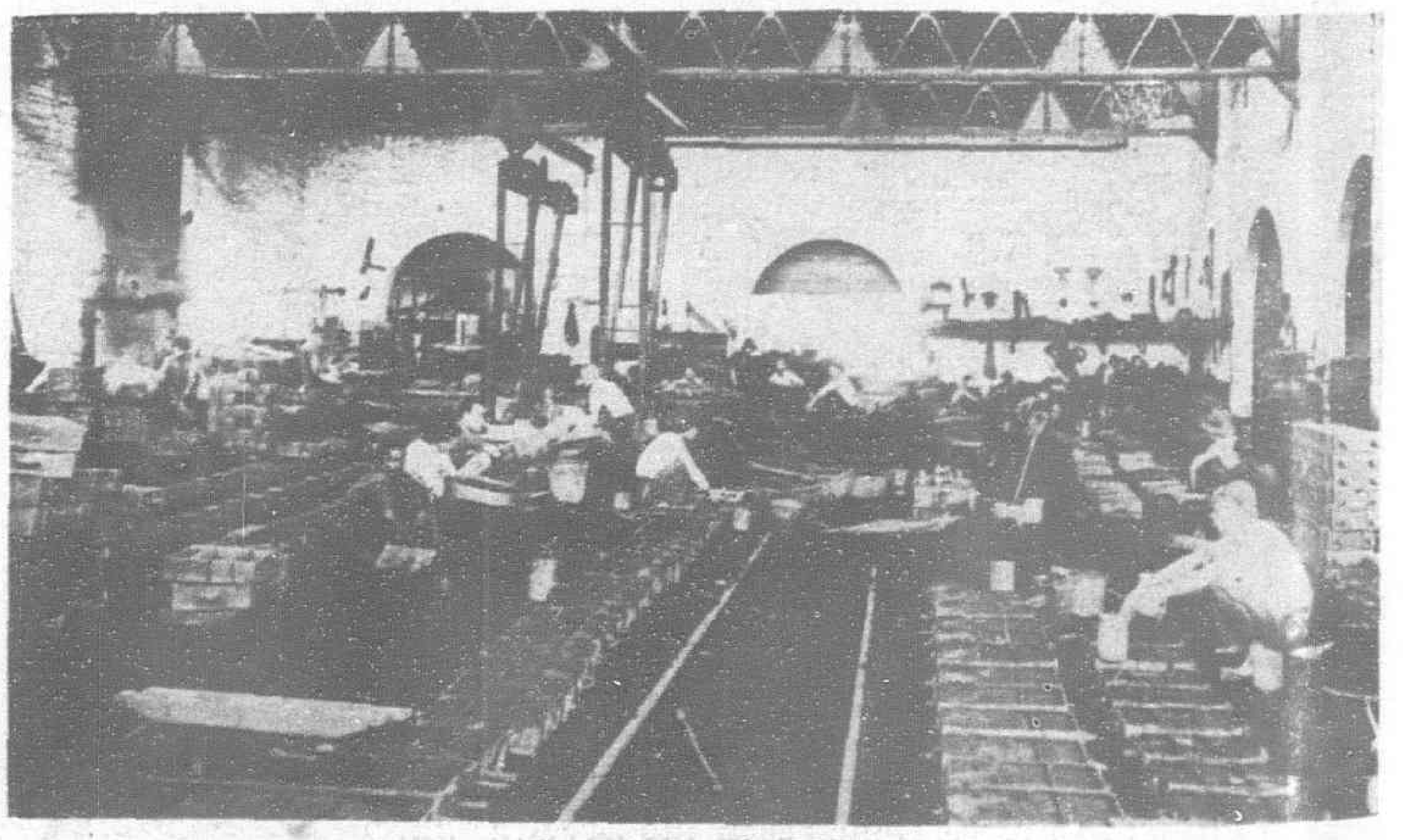

Carriage Shop

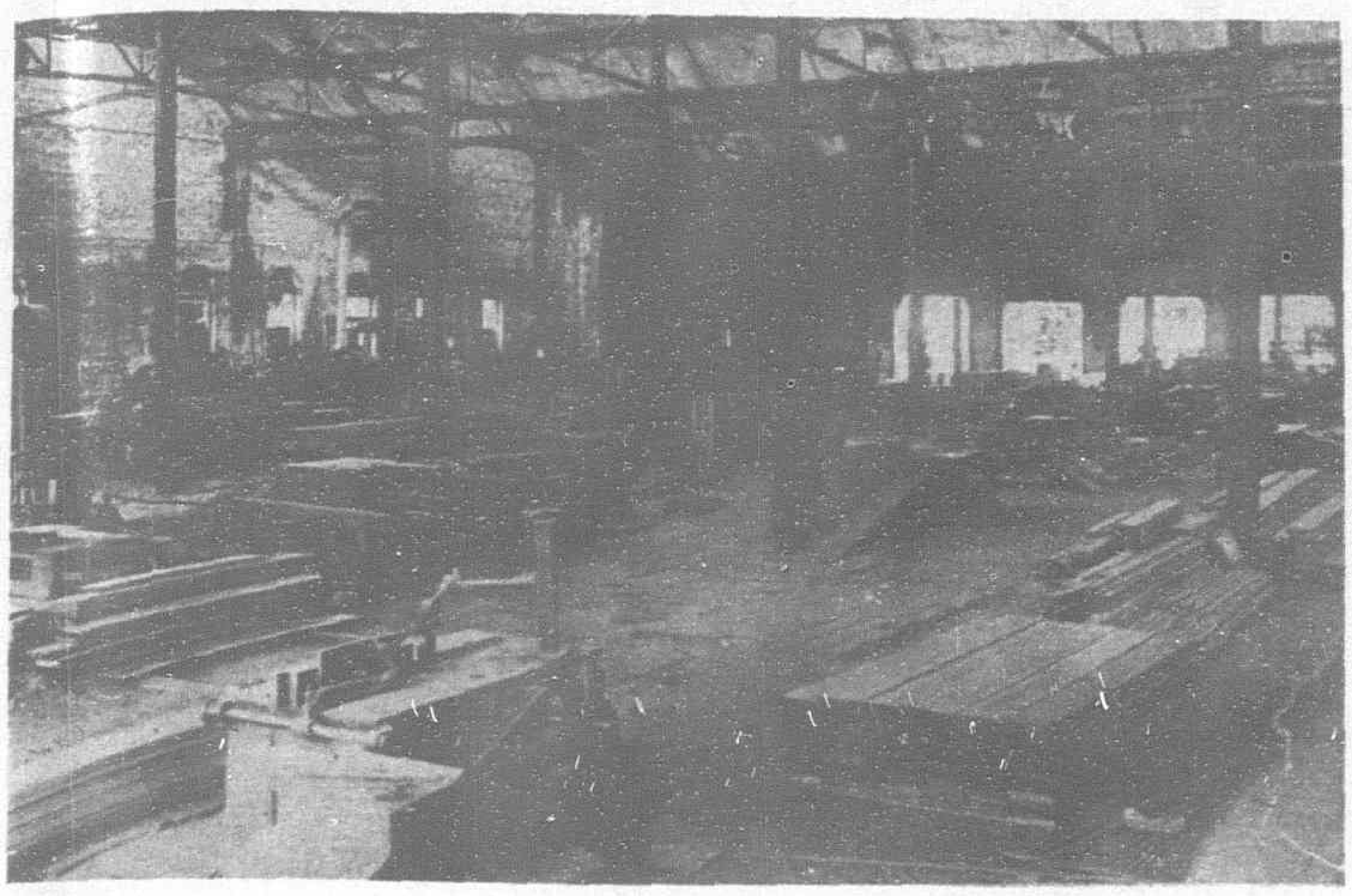
for future expansion and will become a brass finishing shop. Approximately 110 locomotives are repaired annually, a number which could be increased, given additional machinery. Adjoining a yard used for stripping engines is the foundry with a cupola of 5-ton capacity. The floor is covered by two five-ton foundry cranes. The whole of the requirements of the locomotive department are cast in this shop. Chinese labor is employed and no difficulty whatever has been experienced in producing complicated castings such as cylinders, without waste or defect. Adjoining is the brass foundry where a pit furnace for 6 crucibles is installed and also a Morgan tilting furnace. A small pattern shop completes the lay-out. The locomotive stores, which is a branch of the general stores department, is situated within close reach and stocks all articles in daily consumption as well as locomotive and other spare parts. A large copper and tinsmiths shop completes the lay out on the south, or locomotive side of the traverser.


Erecting Shop

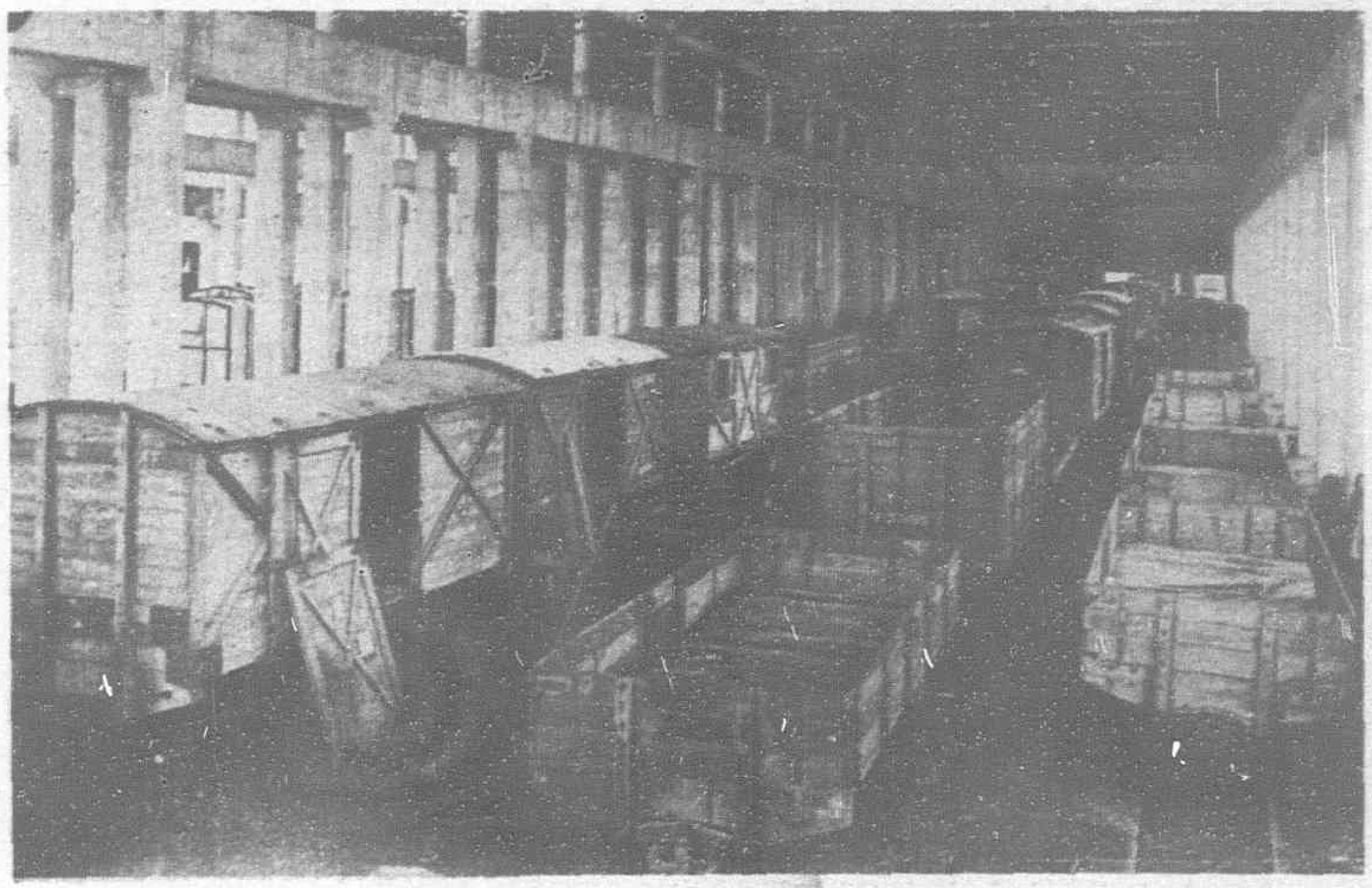
Opposite is the carriage shop 660-ft. long by 90-ft. wide served by three 15-ton overhead cranes, two being arranged on one bay. There are three roads on each bay, the centre road being for wheeling out-going vehicles. The shop repairs and repaints 240 vehicles a year, and is capable of a considerably larger out-put, if required. Adjoining is a building in which is housed ratan workmen and upholsterers. A small paint shop for furniture, sign boards and other light articles is situated next to a paint mixing room from whence all paints and painting materials are issued to the whole of the works. Here too is the electrical train lighting establishment consisting of a fitting shop, lead burning room and cell cleaning and carriage shop, A pit road runs past the shop thus facilitating the work of fitting out carriages with electrical equipment. West of the carriage shop is the smith shop which is equipped with 5 steam hammers varying from 3 cwt. and 15 cwt. capacity. Tyring is done here, a crane being arranged for handling the wheels. Spring making and repairs is, of course, an important activity. Next is the boiler shop on two bays of 37 and 51-ft. wide 342-ft. long. These are served with a 15 and 12-ton crane respectively.


Automatic Lathes, Machine Shop


Corner in Foundry



Saw Mill



Wooden Vehicle Bay, Wagon Shop

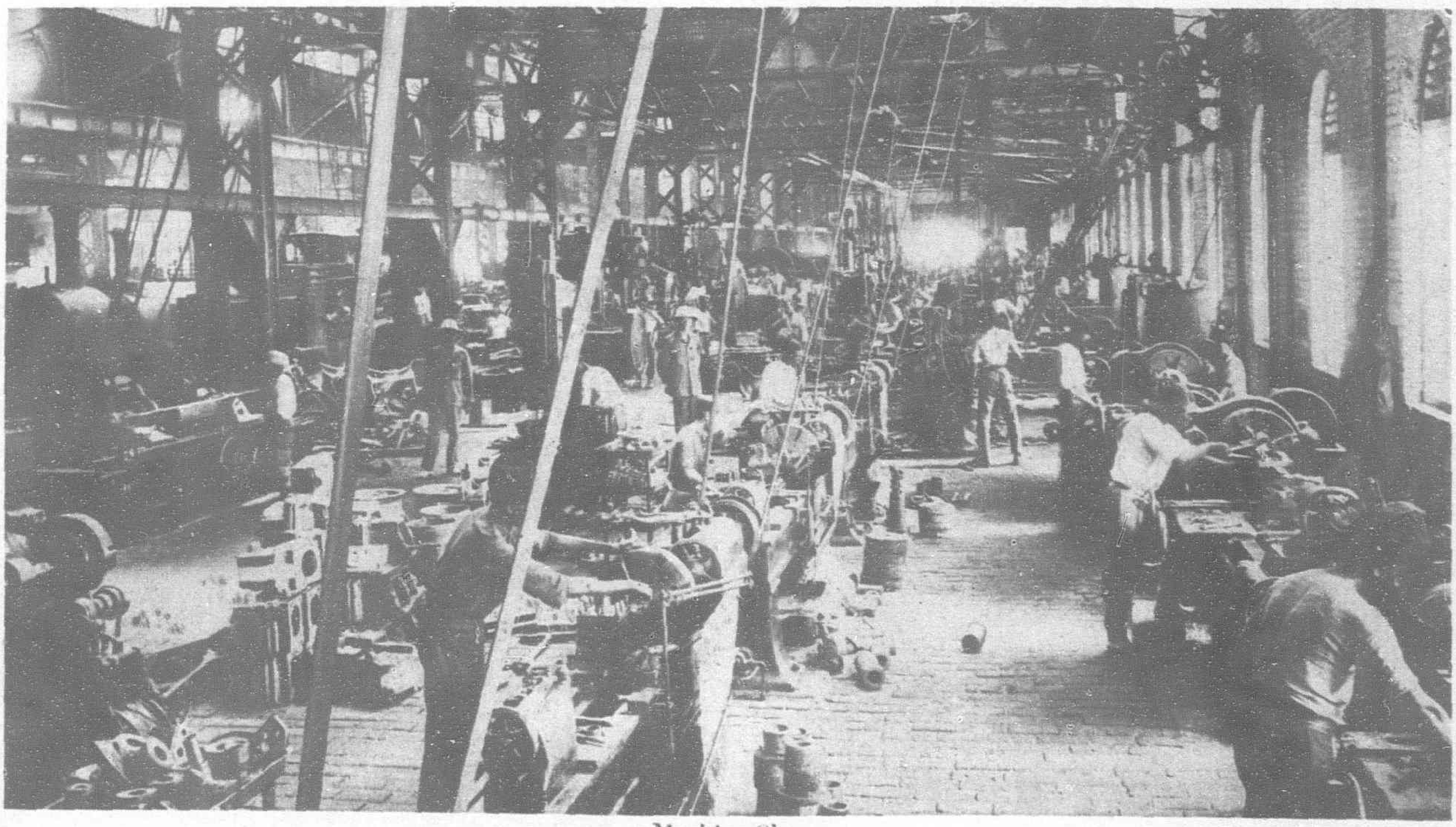
This shop, recently extended in re-inforced concrete is supplied with machines, rolls, shears, etc., necessary for boiler makers' work. Here is located the oxyacetylene welding branch, a department which is daily increasing its business. A plant for hydraulic rivetting and light press work is also supplied. Conveniently adjoining is the steel wagon bay of the wagon shop, a re-inforced concrete structure consisting of two bays each 562 ft. long by 60-ft. wide. Each bay is served with one 12-ton overhead traveling crane. Two drills and a wheel lathe are provided. Facilities are provided for testing the tightness of steel covered goods wagons, an essential precaution for the safe transport of goods in a country subject to exceptionally heavy rainstorms. Heavy repairs to approximately 30 wagons are completed weekly.

The old carriage shop which adjoins the saw mill is now used for carriage and wagon body building. It has been the practice for several years for the F.M.S. railways to construct their own carriage bodies and wagons out of local timber and no fewer than 250 carriages, and 2,000 wagons have been locally constructed. For this purpose the saw mill in addition to the usual breaking down saws, is provided with heavy machines for planing, morticing and end tenoning of the heavy timbers used in rolling stock construction. A copying lathe for producing tool handles out of local timber is installed, it being found that the native employee is not critical of the hammer and "changkol" handles he uses. By this means no small amount of wastage is put to use. A cyclone extractor is installed and serves the main saws.

The workshops are electrically driven, power being partly obtained from the public works department supply and partly generated by a 250 k.w. Allen set supplied with steam from a Babcock and Wilcox boiler. Water supply is from a stream 400 yds. from the site and is pumped into an elevated tank of 30,000 gallon capacity by two electric turbine pumps.

The European staff including that of the stores department number 21 and is housed a short distance away in roomy bungalows. Upwards of 1,800 men of different races are employed, Chinese and Tamils being the two chief sources of labor.

Hydraulic Plant, Boiler Shop

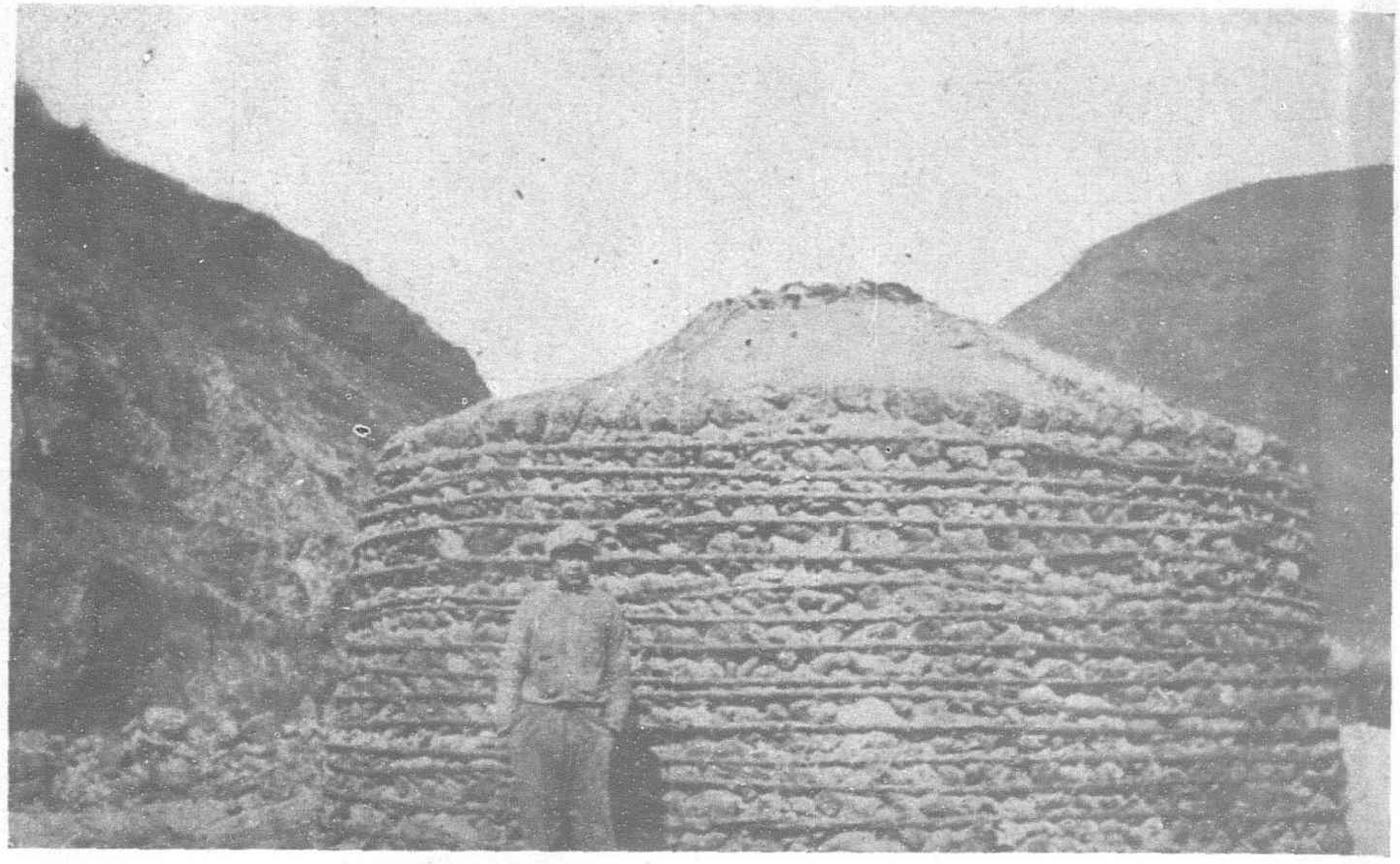


Machine Shop

Manufacture of Lime in China

One of the Oldest Industries but Not One Modern Lime Plant

By M. H. Chou, M.S.



Native Chinese Method of making Lime

IT is a very hard matter to trace the time when the lime was first made in China, or first used for building purposes, or as fertilizer. It is understood that the Chinese have used it at least several thousand years.

Occurrence

Limestone occurs very abundantly in China. We can find it in every province. Moreover, there is quite a bit of dolomitic limestone, as reported in the record of the geological survey.

Manufacture

The process of manufacture of lime from limestone, as practiced in China, is entirely in the hands of farmers or those laborers who are employed by some companies for manufacturing lime.

First, limestone in the quarry is broken by hand or by gun-powder. Big lumps of limestone are piled up to form a kiln where wood and straw are burned until most of carbon dioxide is driven off.

Another method of manufacture, as shown in the view herewith, is very interesting. First of all coal dust is wet and pressed into cakes together with mud. Then the coal cakes and limestone lumps are piled together one upon another. The whole pile is surrounded by some fire-resisting clay-stone. Fire is started from a small opening at the top of the pile. The pile burns for a week. After that the surrounding claystone is taken away and the lime formed is sorted out from the pile. It takes an enormous amount of labor. This process is quite feasible in China because of unparalleled cheapness of labor in China.

The price of lime in Shanghai is two Mexican dollars (equivalent to $1.50 gold) per 250-lbs. It is extensively used for building purposes. The farmer uses it as a fertilizer. The paper manufacturer uses it to disintegrate the bamboo. It is used as flux for making pig iron in many iron works in China. The wine maker cures the sourness of wine by adding lime to it and filtering. The pharmacist uses it for dehydrating purposes. The cement maker uses it for making cement.

However, the use of lime can be greatly extended as fertilizer by the farmer, if there is a new modern grinding mill to reduce lime into powder. As there is practically no work done either by the government or by private interests to test the acidity of the farm soil, it is very hard to convince the farmer to increase the amount of his crops by means of lime.

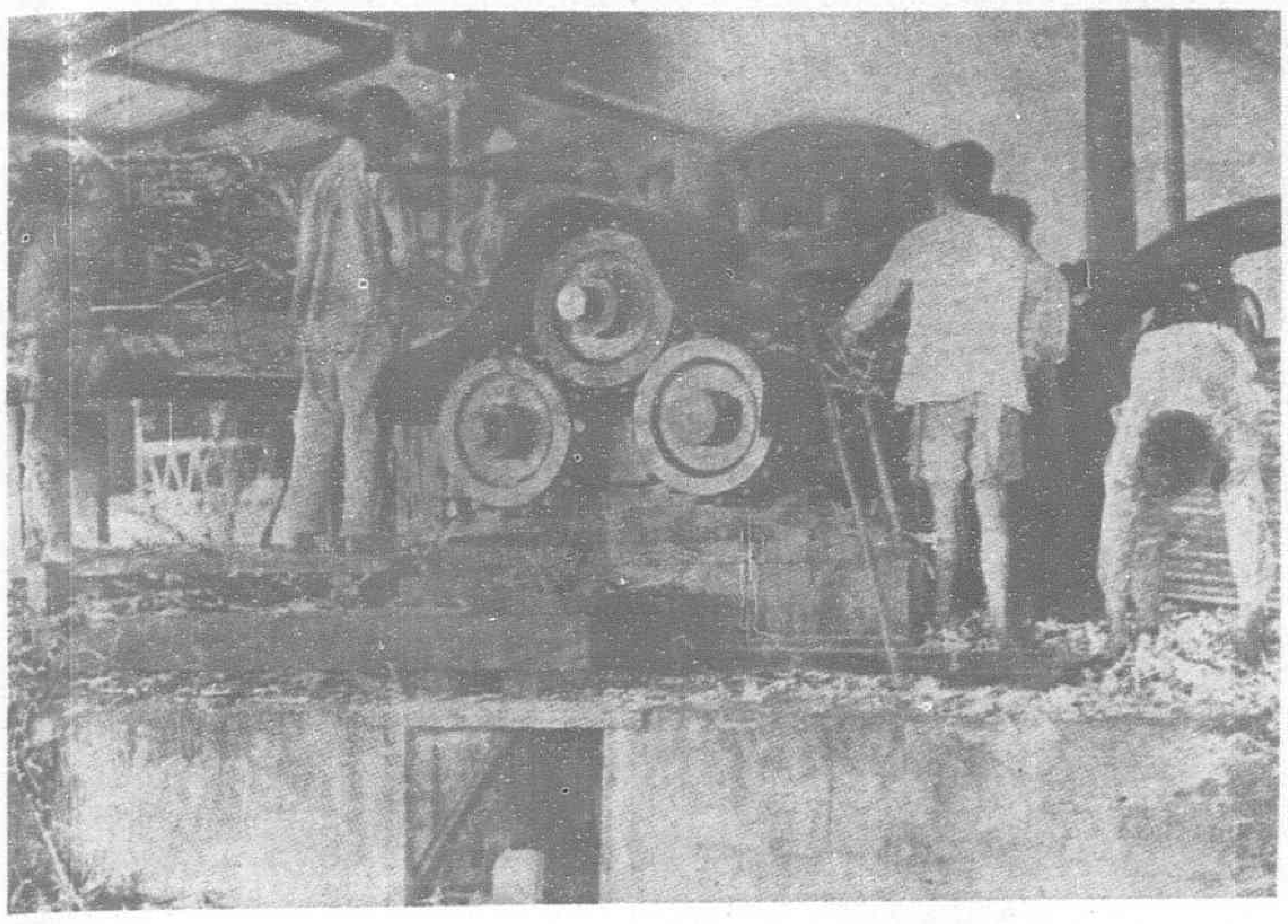
Future Outlook

The lime industry in China has not yet been modernized. But it will be eventually done in the near future, for there is a great demand for the lime of better quality. It will present a great opportunity to American manufacturers of lime kilns to introduce their equipment into the field of manufacturing activity in China. So far as I know, there is no single concern which is employing a modern lime kiln for the manufacture of lime.

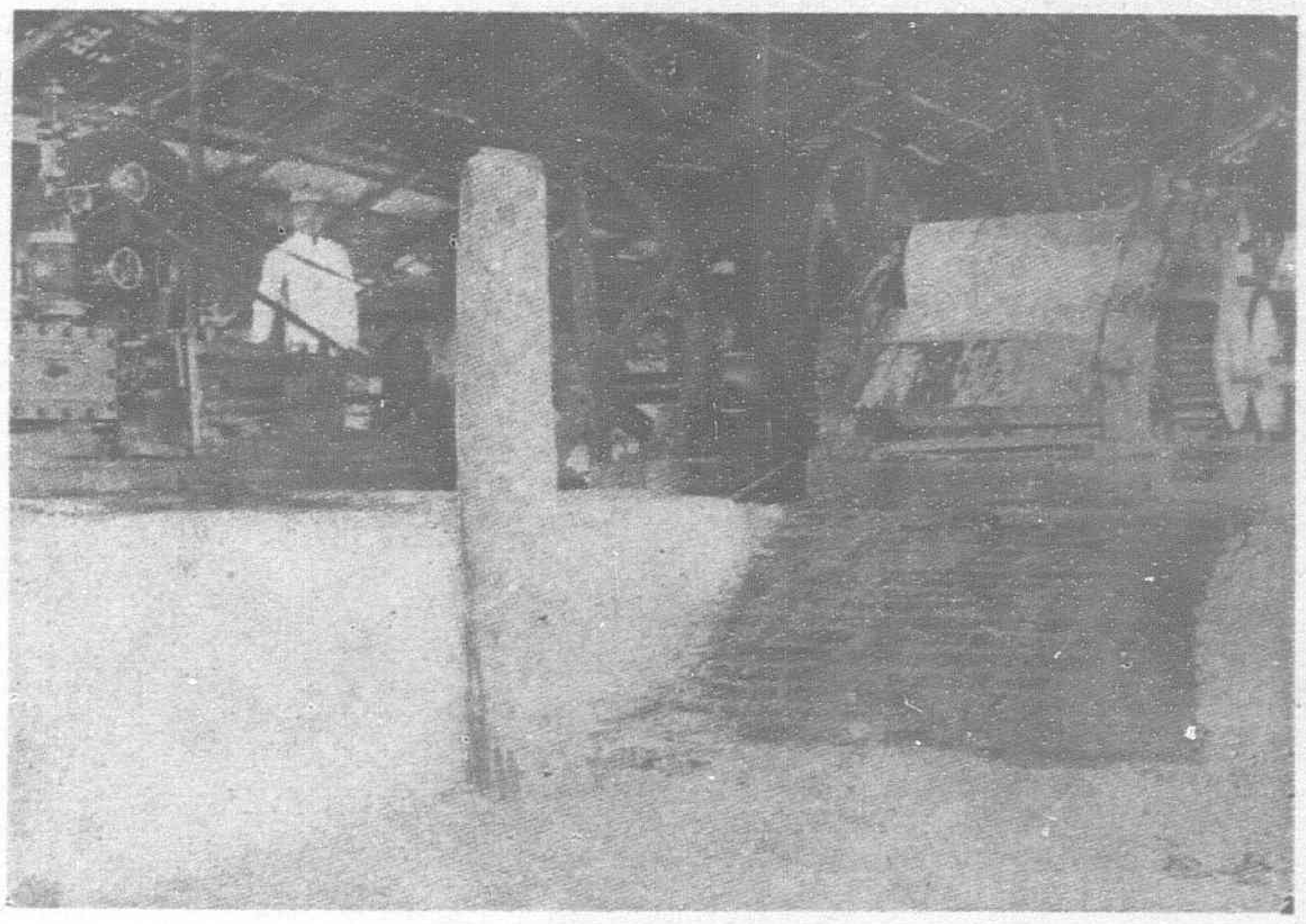
Locality	SiO_2	Al_2O_3	CaO	MgO	CO_2
Han-chin (Mukden)...	.393	1.754	37.893	7.676	49.890
Ka Ban—					
Sample 1	4.80	2.30	18.52	24.51	42.95
Sample 2	1.60	.47	36.94	9.27	47.76
Sample 3	10.44	.99	28.49	15.68	41.58
Sample 4	6.893	1.185	29.993	28.208	40.609
Sample 5	9.74	1.50	26.57	17.25	43.62
Sample 6	9.39	.66	32.48	8.76	45.77
Nee Hsin—					
Sample 1	.13	1.18	42.47	11.68	—
Sample 2	.10	.25	50.24	6.10	—
Sample 3	1.18	.32	46.83	8.34	—
	SiO_2	Al_2O_3	CaO	MgO	CO_2
Wusih—					
Sample 1	5.39	6.13	41.25	7.78	39.24
Chao Hsin	15.18	7.13	39.85	5.14	30.80

The analyses of some nearly pure high calcium limestones are as follows:

Locality	SiO_2	Fe_2O_3 & Al_2O_3	CaO	MgO	CO_2 $+H_2O$
Wusih—					
Sample 1	.39	.19	54.58	.71	43.74
Sample 2	Trace	.20	55.51	.53	43.61
Sample 3	.10	.17	54.66	.93	43.68
Sample 4	2.95	1.10	52.30	.51	42.43
Sample 5	4.02	2.25	50.47	.99	41.31
Sample 6	1.83	.71	52.05	1.43	42.44
Nee Hsin—					
Sample 1	.41	.10	53.18	.90	—
Sample 2	.49	.12	52.94	2.31	—
Tung Ting—					
Sample 1	.05	.14	55.38	.43	—
Sample 2	.43	.15	53.51	2.11	—
Sample 3	.29	.23	54.87	.82	—
Sample 4	.05	.08	55.50	Trace	—
Kan Tze—					
Sample 1	.05	.11	55.04	.13	43.70
Sample 2	.42	.32	54.18	.22	43.38
Sample 3	.15	.20	54.96	.18	43.75
Ching Kiang—					
Sample 1	1.83	1.10	53.50	1.74	42.76
Sample 2	1.10	.27	54.75	.64	43.21
Sample 3	1.79	.49	53.87	.53	43.02
Lungtah—					
Sample 1	.36	.30	55.44	.43	43.75
Sample 2	.09	.11	55.43	.16	—
Tong Shan	2.22	.42	52.46	.30	42.80
Wuchow	.06	.09	55.94	.18	43.75
Unknown—					
Sample 1	.22	.18	55.91	.32	—
Sample 2	3.38	1.50	53.61	.62	—
Sample 3	3.57	.39	51.09	2.98	—
Sample 4	.99	.27	54.63	1.19	—



Crushing Sugar Cane, Bago, Occidental Negros



Hacienda San Jose—Mill and Engine, San Carlos, Occidental Negros

The Manufactures of the Philippines

Rapid Strides Being Made in the Development of Industry

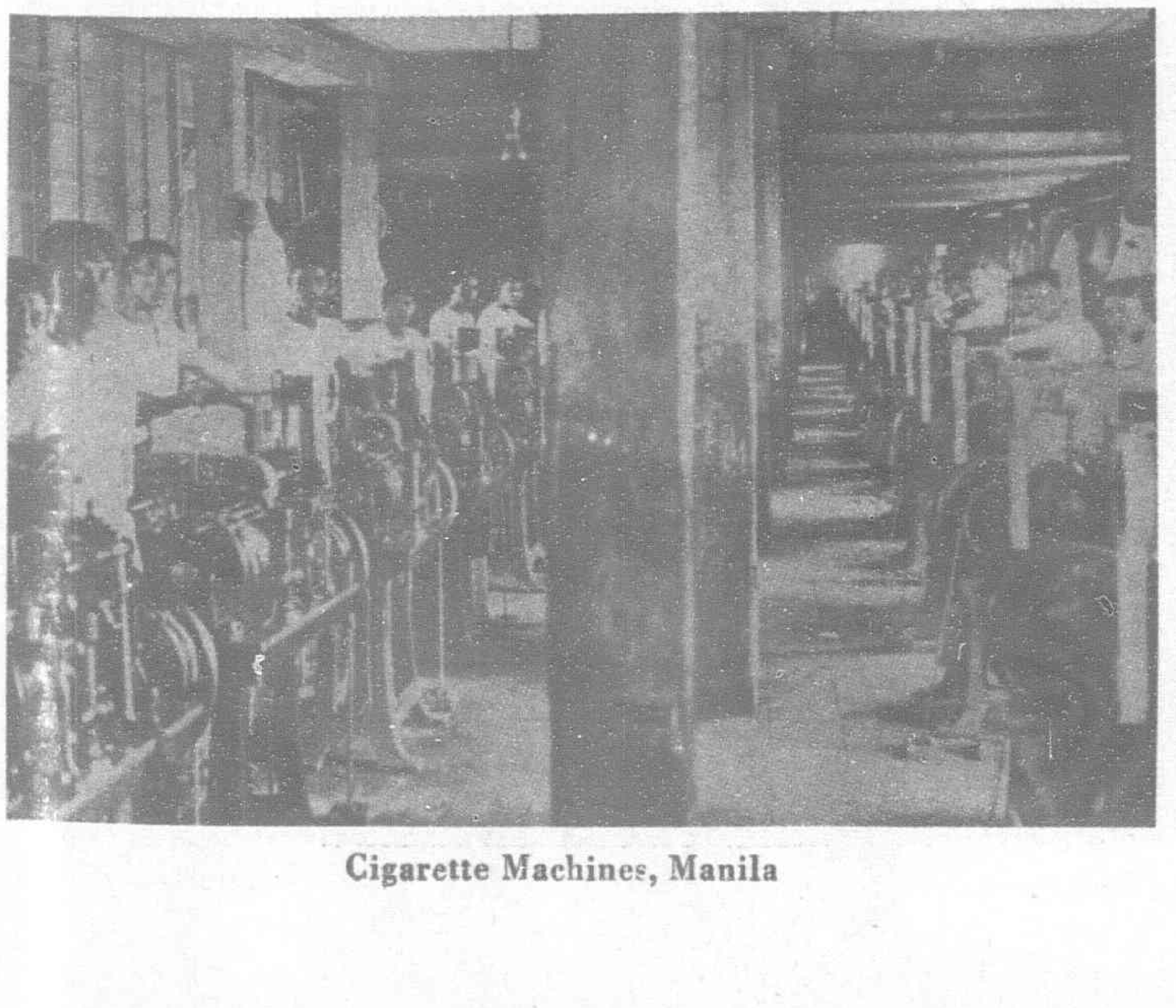
MANUFACTURING in the Philippines in general was confined until recently to small shops that produced barely enough to meet the immediate and local wants of the inhabitants. The manufacture of cigars and a few other commodities, however, was carried on on a large scale prior to the American occupation. In recent years modern machinery has been introduced into various industries, and the results are shown in the notable strides in the exportation of manufactured and partly manufactured articles. From a total value of about P.2,000,000 in 1900, these exports rose to over P.128,000,000 in two decades. The greatest bulk of the exports in these articles in 1900 consisted of cigars, the rest being cigarettes, cordage, and a little coconut oil. In 1923, sugar valued at P.69,038,246 still kept its place at the top of the export list; cigar exports increased fivefold; coconut oil reached the amount of P.28,133,164; embroideries, P.12,746,529; and cordage, P.1,497,769. Many other important manufactures, such as hats, knotted hemp, pearl buttons, ilang-ilang oil, etc., figured in the list of exports.

As has already been stated, the Philippines is not as yet a manufacturing country and will probably not become so for some years to come. The foregoing figures tend to indicate the extent of its possible development along industrial lines. The available local supply of raw materials is extensive and skilled labor can be secured. Among the available raw materials are Manila hemp for cordage, twine, hats, cloth, etc.; ilang-ilang for perfumery; lumber, shells, etc. Only a small beginning has so far been made in manufacturing these raw materials into finished products before being exported.

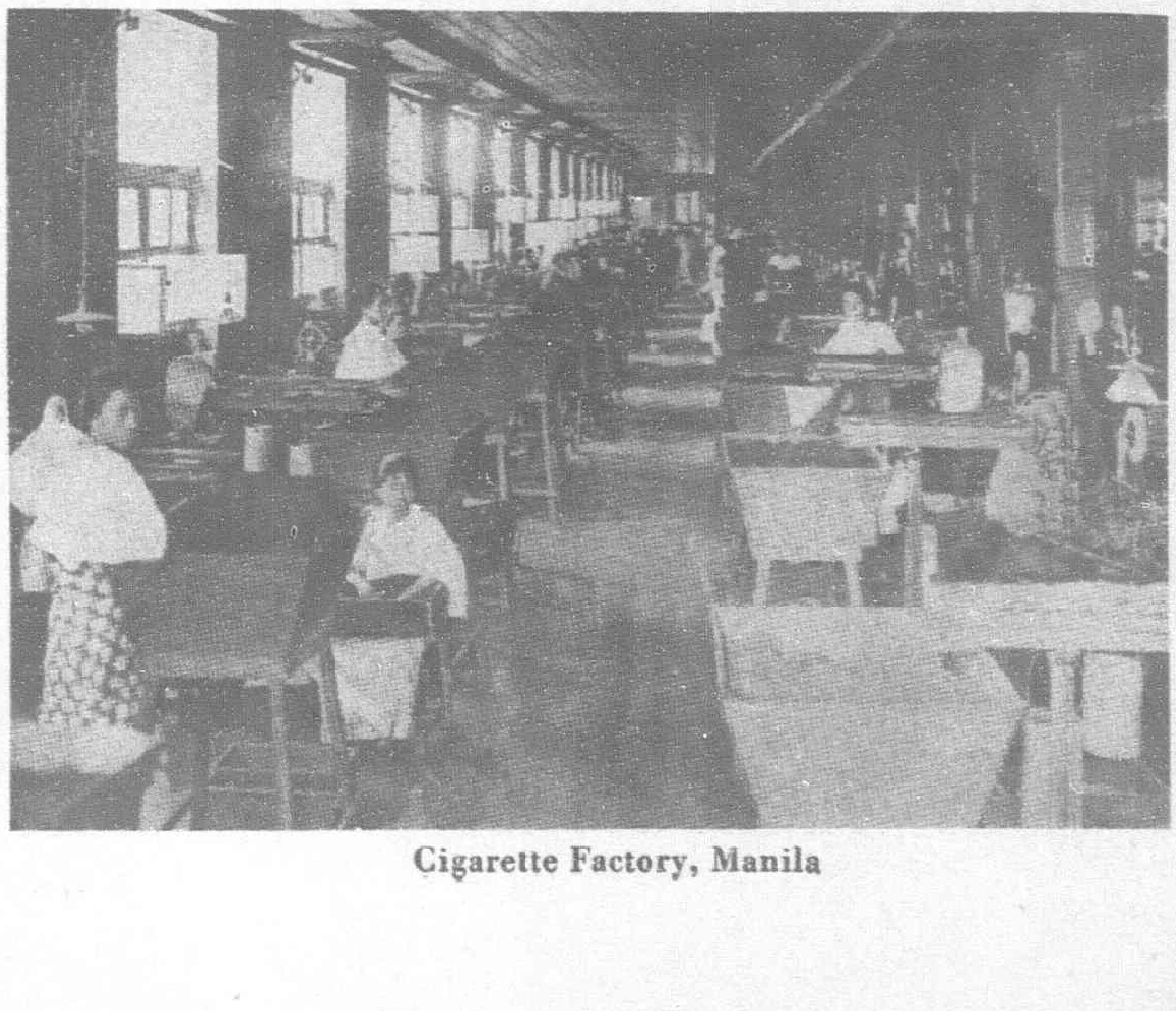
Sugar Centrals

The last seven or eight years have witnessed by far the greatest development in the history of the Philippine sugar industry. The establishment of modern sugar centrals was an important factor in this development. The first modern sugar central in the Philippines was established in 1910, by the Mindoro Sugar Company, at San Jose, on the island of Mindoro. Many other centrals with improved machinery were subsequently installed in almost all the leading sugar provinces of the islands, so that following 1910 sugar production and exports considerably increased. Early in 1924, thirty-one sugar centrals with a total capacity of 22,970 tons of cane per day were in operation. Most of these centrals are located in Negros. The majority of them are owned by Filipinos and most of them are engaged in both milling and cane-growing.

The principal kinds of sugar produced in the country are centrifugal and "muscovado." A small amount of refined sugar is also now being produced and exported. Centrifugal sugar is produced in sugar centrals, while the "muscovado" is crude or brown sugar manufactured in the antiquated mills and made to crystallize in open trays. These two kinds of sugar are graded



Cigarette Machines, Manila



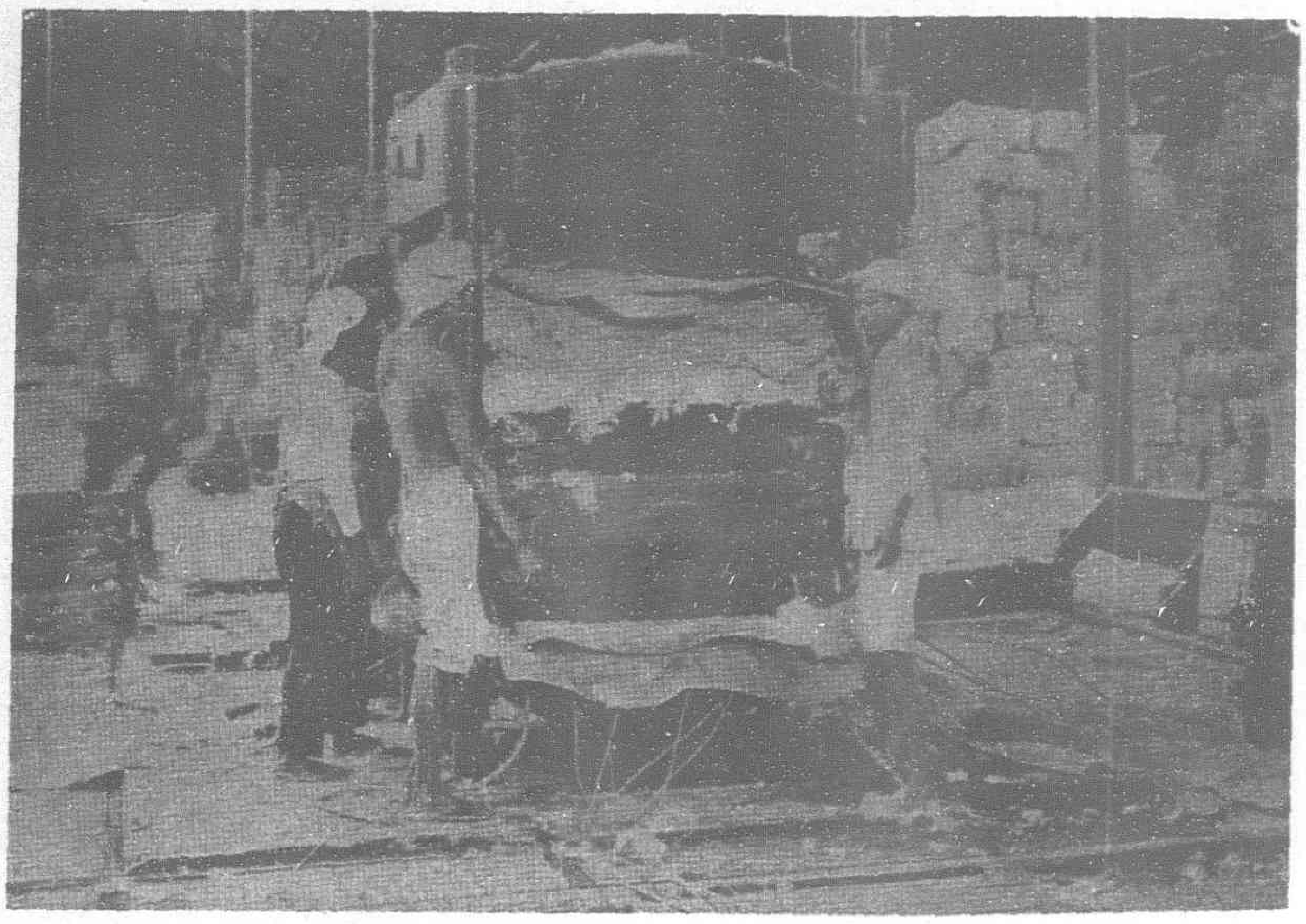
Cigarette Factory, Manila

according to the degree of polarization. Centrifugal sugar ranges from 96° to 99° polarization although very little above 97° is actually produced. The different commercial grades of "muscovado" sugar, based on polarization, are as follows :

Grade	In Manila	In Iloilo
No. 1..	86°—88°	87°—90°
No. 2..	84°—85.9°	85°—86.9°
No. 3..	82°—83.9°	82°—84.9°
No. 4..	80°—81.9°	80°—81.9°
No. 5..	78°—79.6°	76°—79.9°
No. 6..	76°—77.9°	70°—75.9°
No. 7..	below 76°	

Sugar of lower polarization than 70° is called "corriente" in the Iloilo market, and is of a very dark color.

Muscovado sugar is usually packed in buri bags. The bags are then tied with rattan. Centrifugal sugar is packed in jute bags of convenient size (50 kilos) for handling. These are sewed up with jute strings. Buri bags are manufactured in Bantayan island, in Cebu, and in some towns of Capiz province. Jute bags are imported from India. They are more durable but much more expensive than buri bags.


Baling Native Cotton, Manila

The present sugar production of the Philippines could be more than quadrupled if all suitable sugar lands in the country were cultivated and additional modern mills or centrals constructed. The centrals are now limited to a few provinces, and their construction in other regions would be a large factor in the stimulation of increased acreage devoted to this staple, especially among small farmers and producers. With many of the old wooden mills still in use and relatively few sugar centrals now in operation, the annual sugar production reaches from 300,000 to 400,000 tons. On the other hand, Cuba, with an area only about as large as Luzon and Negros combined, produces about 4,500,000 tons of sugar every year. In 1923 Cuba had 182 sugar centrals while the Philippines had only 31.

Coconut Oil Mills

The first concern to engage in the production of coconut oil in the Philippines was organized in 1909. Previous to that time the oil was produced by crude methods and exports were almost negligible. Before the war broke out in Europe only one oil mill was in operation in the islands. During the latter part of 1918, it was estimated that the thirty-one oil mills in operation, which produced an average of 1,300 tons of oil per day, required a yearly supply of 800,000 tons of copra, as against the islands' annual production amounting to only 300,000 tons. There were, therefore, more mills than was warranted by the available local supply of copra, and when the demand slackened many of these were forced to close. At the present writing there are but a few mills in actual operation. Almost all of these mills are located in Manila, Cebu, and San Pablo. Their aggregate monthly output is approximately 12,000 tons.

Button Factory, Manila

The classifications for coconut oil are not so definite as for sugar, tobacco, and hemp. Several grades of oil are, however, known in the world market as the Cochin, Java, Ceylon, Japanese, and Manila grades. This classification is based on the fatty acid contents of the oil, the less free fatty acid it contains, the better the quality.

Tobacco Factories

Originally the bulk of the tobacco exports from the islands consisted of leaf tobacco but the present tendency is to encourage exportation of its manufactures, such as cigars, cigarettes, etc. At the present time more than half of the annual tobacco exports is composed of cigars alone. In 1923, there were 88 cigar and 33 cigarette factories in operation, most of which are found in Manila. During that year, they manufactured 84,329,254 cigars and 4,485,775,960 cigarettes for local consumption, and 339,219,783 cigars and 39,426,606 cigarettes for export to foreign countries. Some of the bigger factories own plantations in the provinces from which much of their supply of leaf tobacco is taken. The greater number of the factories, however, get their supply from producers in various parts of the islands.

All leaf tobacco to be manufactured is taken to Manila by agents or individual sellers who dispose of it to the manufacturers or exporters. Agents of most of the Manila firms are stationed in all the leading tobacco-producing regions of the islands, to buy leaf tobacco either direct from the producers or through individual buyers.

The tobacco leaves after being dried reach the manufacturers in hands or "manojos," and the manufactured cigars and cigarettes are shipped in boxes properly labeled and stamped, after being rigidly inspected and carefully classified.

Skilled workers, a majority of whom are women, supply most of the labor needed in the tobacco factories in Manila and new workers can always be secured, so there is little of a labor problem to handicap the industry. All cigars are made by hand.

Manufactured Philippine tobacco is known in the trade as Manila cigars and cigarettes, but each tobacco factory has its own trade names, and altogether there are more than 3,000 different brands. Standard Manila cigars rank with the best and choicest smokes of their kind in the world markets to-day. The markets for them are still growing, particularly in the United States. The present problem is to get them more widely known. A tobacco agent of the Philippine government has been appointed in the United States to popularize and look into a more extensive market for Philippine tobacco. With the steady growth of the market for Manila cigars and cigarettes, the amount of production has correspondingly increased every year.

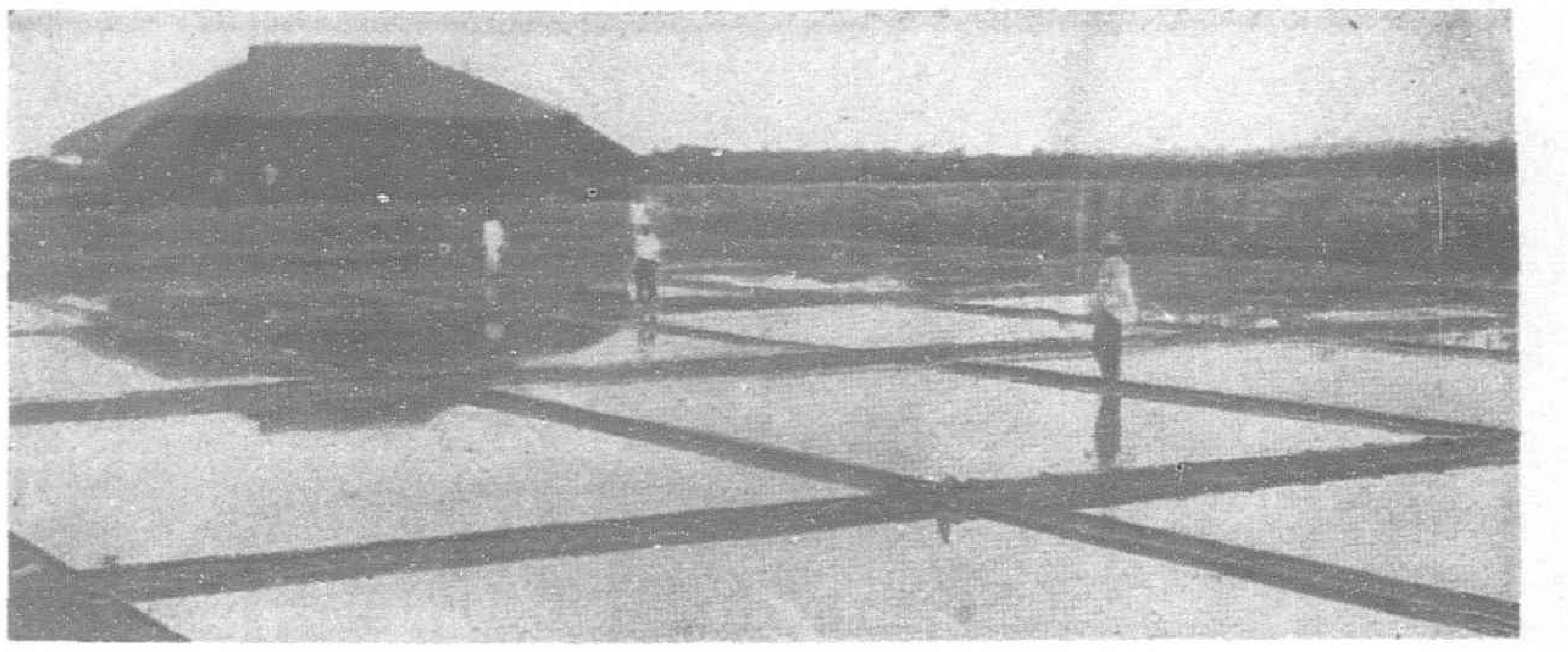
Hemp Articlcs Manufactured

Unitl recent years almost all the Philippine exports of hemp consisted of the raw fiber, and even at present most of the exports are in this form. The cordage factories in the importing countries make the fiber into ropes, cables, and different forms of twine and coirs. There has lately been noted, however, an increasing development of manufacturing industries which turn out hemp-made articles. The most important among these are rope manufacture, the making of hemp braids and hemp hats and the old industry of utilizing the fiber for textile purposes.

Abaca as Cordage Material

Abaca is the premier cordage fiber in the world, owing to its relative lightness, tensile strength, durability, and high resistance to the action of water. The Philippines has a complete monopoly of this cordage fiber, which is greatly in demand in maritime countries. But although hemp as cordage material is unsurpassed especially for maritime use, it was only in 1913 that cordage appeared as an export article. The cordage industry received a great impetus during the war when the demand for cables and ropes was especially great. To-day there are several rope factories in the islands. There is also evidently a steady market for Philippine rope in the United States.

The manufacture of ladies' hats, for which the raw material used is hemp braid, is a young and growing industry. Formerly hemp braids were largely imported from Japan. At present most of the raw material is supplied by a Filipino concern. The making of hemp-braid hats has proved to be so successful in the past that many new concerns have recently been established. As a result the demand for braids now exceeds the supply, and frequently hat makers are unable to fill big orders coming to them due to shortage of hemp braids.



Salt Works, Malabon, Rizal

Besides being manufactured into ropes and braids, abaca fiber is also used in the manufacture of cloths. It is woven with cotton in numerous varieties of patterns and the fabrics thus produced are in every degree of fineness, from delicate silk-like textiles to the coarse material used for fishing nets. The inferior grades and the waste of abaca fiber afford an excellent material for the manufacture of paper of good quality, but this industry has not yet been established.

Rice Mills

In the earlier days the use of rice mills was unknown. Threshing of "palay" by carabaos and pounding in mortars were the common methods. The growers then consumed practically all the rice they raised, and the need for wholesale milling of rice was very little realized, if at all. The localization of rice cultivation in a few regions, because the cultivation of the export crops became more profitable in the places where rice was formerly grown, made rice milling in the former localities imperatively necessary to cope with the growing rice trade. Year by year new mills were therefore established. The local trade in rice has continued to develop and the installation of rice mills has become more widespread.

In 1922, more than 450 rice mills, with a maximum daily capacity of 67,346 cavans, were in actual operation. These mills were distributed in twenty-five different provinces, as follows:

Provinces	Number of Mills	Kinds of Mills Steam	Hydraulic	Man or Animal	Cavans produced
Albay	15	3	12	—	42,555
Ambos Camarines ..	24	10	14	—	39,612
Bataan	4	4	—	—	40,555
Batangas	71	70	—	1	209,958
Bohol	7	—	—	7	1,642
Bulacan	44	44	—	—	1,109,547
Capiz	5	5	—	—	71,055
Cavite	25	23	1	1	199,312
Iloilo	9	8	—	1	137,219
Laguna	78	55	23	—	343,318
Mindoro..	3	3	—	—	10,590
Nueva Ecija	18	18	—	—	337,485
Occidental Negros ..	6	6	—	—	35,973
Pampanga	42	42	—	—	627,803
Pangasinan	8	8	—	—	269,970
Rizal	18	18	—	—	82,268
Sorsogon	6	1	5	—	4,555
Tarlac	16	16	—	—	414,266
Tayabas	37	22	14	1	83,816
Zambales	3	3	—	—	5,748
Other provinces ..	13	11	1	1	218,747
Total	452	370	70	12	4,381,994

Most of these mills are run by steam and motor and some by hand, water, and other means. A great deal of pounding and hulling of rice by hand is still being done in the provinces; but the need for rice mills is now realized in many of the centres of production, and the mills are becoming more widespread. The number of rice mills already established is deemed adequate to handle the present output but a better distribution of the mills is needed. The government is urging a more extensive production of the cereal, and as production will increase, a corresponding greater number of rice mills will be required.

Distilleries

The manufacture of distilled spirits, wines, beer, and fermented liquors has been carried on since the earliest days of Philippine history. At first the output was probably confined to supplying the immediate wants of the makers with little, if any, used in trade. Spain encouraged the importation of wines and liquors, and the fermentation of the nipa sap and sugar juice became more widespread. Distilleries were later established in different parts of the country, though catering mostly to local demand. Beverages did not become an item of export until the year 1915. The total value of the entire output of liquors in the Philippines is estimated to be between P.16,000,000 and P.20,000,000 annually. The total number of lagorers employed in this industry ranges from 1,000 to 1,500. At present the liquor exports are mostly to Hongkong, Japan, and the French East Indies.

Among the most important local materials used in the manufacture of distilled alcohol is the sap of the nipa palm, which grows extensively in various parts of the islands. The nipa swamps are most abundant in Bulacan, Laguna, Pangasinan, Pampanga, Capiz, Cagayan, Surigao, Samar, and Tayabas. "Tuba," as the nipa palm wine is called, used to be the favorite drink of the inhabitants. Besides the nipa tuba, other important products are used in the Philippines in the manufacture of alcohol, namely, corn, rice, sugar cane, molasses, and coconut sap.

Shoe Manufacture

There are two types of shoe-making establishments in the Philippines, namely the modern factory using labor-saving machinery, and the small shops in which shoes are made by hand. In 1918, there were 138 shoe establishments and factories with a total production of P.2,350,327. The amount invested aggregated P.1,677,616.

There are only a few modern shoe factories in Manila at the present time. In 1918 sales of these factories were estimated at about 200,000 pairs valued at P.2,000,000. These modern factories manufacture a great variety of shoes for sport and outing, military, and everyday wear.

At present there are about one hundred and forty small shoe shops in Manila and probably about the same number in the provinces. These shops are owned mostly by individuals or partnerships, with small capital. Their output depends upon actual local demands, but although it is much less in quantity than that of the modern factories, there is a greater variety of styles to suit the tastes and whims of buyers. It would be very difficult to classify the great variety of shoes made to order in these small shops, but it may be said that they are usually made in accordance with the latest styles in the United States.

The actual demand for shoes in the islands is far greater than what the present factories and numerous shoe shops in the country can meet. Over two million pairs of shoes valued at about four and a half million pesos were imported in 1918, decreasing in 1922 to only over 703,000 pairs valued at P.1,226,460, and in 1923 to 73,421 pairs valued at P.277,759. These figures indicate the ample room for the native shoe industry to expand. The local market for shoes is assured. The establishment of more modern shoe factories will reduce considerably the present importations of shoes into the Philippines from the United States, Europe, and China.

Philippine Furniture

The making of furniture is carried on extensively in the Philippines, generally as a household industry, there being an abundance of raw materials on hand, such as hard woods (narra, molave, ipil, etc.), soft woods (almon, lauan, and others), bamboo, and rattan and other vines. In the large cities, especially in Manila, there are large establishments engaged in the manufacture of high-class furniture, such as beds, tables, chairs, settees, office furniture, etc. A conservative estimate of the yearly output may be placed at around P.2,000,000. All kinds of excellent furniture are also manufactured on a big scale by the inmates of Bilibid prison, the insular penitentiary of the islands, the articles produced being destined for both local and foreign markets. Different kinds of bamboo and rattan furniture are common chiefly because of their lightness, durability and cheapness. Mention may be made of the San Miguel rattan chairs which are manufactured in Bulacan on a large scale and distributed throughout the entire archipelago. The familiar Hongkong bamboo and rattan chair is manufactured from materials exported from the Philippines. This is rapidly being supplanted, however, by the San Miguel product which is steadily increasing.

Electric Light and Power Plants

There are in all about 35 electric light and power plants in the Philippines, not including small lighting systems for private use, in which over P.31,000,000 have been invested. Each plant operates under a special franchise and is under the supervision of the office of the public utility commissioner. The largest electric light and power plant is the Manila Electric Company situated at Manila. This plant has a present capacity of approximately 17,000 kilowatts, normal rating. It supplies the city with both illumination and power, conducts an electric street railway system within the city and its suburbs.

It will be realized, that even with all these electric light and power plants already installed, many towns in the islands are still in need of such facilities. Hundreds of the big towns, provincial capitals, and centres of population have none, and the demand will grow as they increase in population and wealth. That capitalists as well as individual citizens have not been slow to answer this demand, may be noted from the ever-increasing number of electric and power plants installed and new franchises granted for this purpose in late years. In 1918, there were only 14 plants in operation, and in April 1924, this number had increased to 43. The notable increases of the yearly importations of the equipment and machinery needed for these plants, further corroborate this.

Almost all of the electric light and power plants' equipments and apparatus are of American manufacture. In 1923, the islands imported electrical instruments and apparatus to the value of P.2,331,090 as compared with P.1,891,967 during the next preceding year. It may safely be stated that the United States supplies over ninety-five per cent. of all electrical instruments and apparatus used in the Philippines.

Salt Manufacture

Nothing definite is known as to the beginnings of the salt industry in the Philippines, although its existence has been traced back by Spanish writers to over three hundred years ago. It is probable that families dwelling on the sea borders of the Philippines manufactured salt in past years in the same manner as they do to-day, at least for their own consumption. At the present time the industry is common in the provinces of Rizal, Cavite, Cebu, Iloilo, Bulacan, Ilocos Sur, La Union, Pangasinan, Ilocos Norte, and other provinces on the coast.

The annual output of salt in the islands is large, as shown in the following figures :—

Year	Kilos	Value
1911	18,333,000	P.350,000
1912	19,147,000	574,511
1913	19,500,000	575,000
1914	20,000,000	590,000
1915	22,500,000	600,000
1916	24,750,000	742,500
1917	26,000,000	780,000
1918	30,000,000	900,000
1919	32,000,000	900,000
1920	62,383,000	1,401,307
1921	31,247,000	800,686
1922*	32,878,000	386,850
1923*	31,306,000	530,401

Of all local industries few lend themselves more readily to comparatively easy means and effort than does the salt industry. The manner of production, as exemplified in the evaporation of sea water, is very simple. The expense of the operation is small; the raw material, which is sea water, may be had at any time without cost ; and no skilled labor at all is needed. The article produced is rather coarse and used mostly in salting shrimps and fishes. For table use of the well-to-do families, refined salt has to be imported.

Candy Factories and Bakeries

Although candy making was long ago introduced into the islands, the industry is still in the infant stage. To-day there are only fourteen candy factories in existence, all of which are found in Manila. Of this number two are owned and managed by Americans, four by Filipinos, three by Japanese, three by Chinese, one by English, and one by Spaniards. Three of these are equipped with modern machinery. There are, besides, about 1,000 bakeries, confectionery, and caramel factories.

Materials for candy making abound, such as coconuts, casoy nuts, peanuts, pili nuts, chocolate, milk, and flavors. Sugar, coconuts, peanuts, and casoy nuts are produced locally. Peanuts are also imported from China and Australia. Pili nuts and chocolate can be obtained locally, but great quantities of these are imported to meet the demand of the factories. Canned milk and flavors are also brought in from foreign countries. The output of these factories is sold in tin cans, bottles, and boxes.

The candy industry in the islands is still capable of expansion. Among the important factors favoring its development, mention may be made of the abundance of sugar, the feasibility of increasing the supply of tropical nuts of different kinds, and the ever-expanding local demand for candies. However, the industry is confronted with the present insufficient supply of containers. The establishment of bottle and can factories is needed.

Soap Manufacture

The manufacture of soap is carried on a big scale in the Philippines. The industry is found mainly in the city of Manila. Some factories are also found in the provinces. There are at the present time one big factory and about eighty other soap manufacturing establishments in Manila, the majority of which are owned by Chinese. These soap establishments produce only the crude article for laundry purposes. The single big soap factory can fill but a small percentage of the local demand for toilet soaps, as may be seen from the increasing importations of this commodity. These imports which amounted in 1910 to only P.338,202 in value, increased to P.1,376,948 in 1920. In 1923, the amount imported was only P.786,932. The production of soap in 1918 amounted to over P.350,000.

---

*Production of 20 provinces only.

The basic ingredients in the manufacture of soap, whether it be the ordinary kind used for washing clothes and cleaning utensils or the delicate toilet soaps, are oil and alkali; the latter may be in combination with sodium hydroxide or potash. The ordinary Chinese soap generally used in the Philippines for washing clothes is a combination of coconut oil, water, salt, and sodium hydroxide, commercially known as caustic soda. There are two kinds of soap manufactured by the Chinese. One is hard and white, the other is soft and yellowish with a hard white portion at one side or at the end. The ingredients used in the manufacture of both kinds are the same, except that the former contains a greater percentage of caustic soda.

Cement Manufacture

The raw materials needed in the manufacture of cement are found in a number of islands. Among the most important of these are the calcareous materials which include pure and hard limestones, and the argillaceous materials which include shales, residual and transported clays, and volcanic tuff.

The following localities possess special advantages as cement manufacturing sites: Cebu island, Mactan island, Albay province, Masbate island, Polillo island, Bani in Pangasinan, Romblon island, Balayan and vicinity in Batangas province, and Loay in the province of Bohol. All these localities have abundant raw materials for cement manufacture as well as water power, or in the absence of water, coal mines that could be utilized for fuel, and excellent facilities for transportation.

The best site for the industry, however, is in the island of Cebu, which has adequate harbor facilities, a good local fuel supply, abundant raw materials, suitable millsites, good roads, and railroad facilities. Labor in Cebu is abundant and is cheaper than in Manila. The island of Negros near Cebu has several lumbering concerns where cement barrels could be manufactured. The Cebu Cement Company, capitalized at P.5,000,000, has recently constructed one of the biggest cement plants in the Orient at Naga, Cebu. The company is now almost entirely capitalized by the National Development Company, a government business organization. It is stated that the plant has a maximum capacity of 5,000 barrels per day, and the reports of its activities are very promising.

There are several thousand other industries some of which might be treated individually because of the magnitude of their production or because Philippine conditions warrant their establishment on an extensive scale. Of the former, may be mentioned sawmills of which there were 68 in March 1924; lithography, printing and book-binding; carpentry; shrimp and fish drying and salting; copra drying; macaroni, spaghetti and vermicelli making; the ice plant industry; gold and silversmith industry; and corn milling. Of the latter may be mentioned the manufacture of dyestuffs, silk, desiccated coconut, pineapple, glass, paper, coir mat, perfume, roofing materials, starch, and papaya gum.

Ship Building

Before the Spanish regimé, shipbuilding was carried on extensively in all the provinces on the sea coast. Wooden ships known as "naos" and "paraos" were built, some as large as the 2,000-ton vessels of to-day, having over 100 oarsmen and capable of carrying several hundred soldiers. These were undoubtedly of large tonnage then, and were used on the high seas. In the Moro regions, "vintas" and other vessels have been extensively built for years, these being large enough for trade with the northern islands and the Dutch East Indies. These fact illustrate that shipbuilding in the past was great industry, and that the people were very skillful as navigators.

In 1918 there were 35 concerns in the boatbuilding business with an aggregate investment of P.12,295,951 and an output of P.P.2,656,508, eighteen of these being distributed in Manila and in seven different provinces as follows: Cagayan, 1; Cavite, 2; Iloilo, 4; Occidental Negros, 1; Manila 4; Pangasinan, 2; Sorsogon, 3; Zamboanga, 1. These concerns are prepared to construct craft of 250 tons or more. Some of them have already turned out vessels of such capacity and have even built much larger ones. Most of these concerns, however, devote their efforts to the construction of small vessels for Philippine waters.

All provinces where the industry is carried on have an almost unlimited supply of timber close to the place of construction. Many other provinces also have abundant timber and labor. A preliminary survey of the shipbuilding industry in the Philippines indicates that the supply of timber and unskilled labor can stand a bigger demand, especially in the provinces of Pangasinan, Cavite, Sorsogon, Zamboanga, Manila and in Laguimanoc, Tayabas, where other might well be located. Shortage of labor is reported only in the province of Cagayan.

In a country where freight rates per mile are even double the overseas charges, and where shortage of prime necessities frequently occurs because of lack of bottoms to transport the products, the need of more ships is indeed apparent. Extensive shipbuilding may and should be done in the Philippines to revive an industry that was once general and profitable. The provinces of Cagayan, Cavite, Iloilo, Pangasinan, Sorsogon, and Zamboanga have facilities for the construction of 250-ton craft. Many others not mentioned are engaged in building smaller vessels. Iloilo builders have constructed vessels of 400, 700, and even 2,000 tons, and are somewhat in the lead, although Cavite, with less definite reports of construction, has equal facilities. Albay and Laguimanoc, Tayabas, might well construct 250-ton or larger vessels.

Iron Foundries and Machine Shops

Practically all the foundries and machine shops now operating in the Philippines are located in the city of Manila. A few of them may be found also in other big cities and towns in the islands, as Iloilo and Cebu. During recent years the great increase in the use of machinery of all kinds in connection with agriculture and manufacturing, has greatly augmented the number and activity of the foundries in the country. There are at present more than twenty machine shops and foundries in Manila, varying from the biggest plant equipped with all kinds of machinery for repair and employing several hundred men, to the several small ones using rather simple devices and equipment, and with only a few laborers employed. Some of these plants are both foundries and machine shops. The foundries do casting both in iron and in bronze. Besides these foundries and machine shops, there are at present over a hundred vulcanizing plants, carriage and auto repair shops doing business in the city of Manila and in the provinces.

Mineral Waters

The use of artesian and distilled water is quite common in Manila. It is estimated that the total daily consumption of artesian and distilled water in Manila is 11,452 gallons. This on the basis of an average daily consumption of 2,863 demijohns of water, each containing approximately four gallons. Not all the inhabitants of the city use artesian or distilled water, however; in fact the majority of the laboring class drink the ordinary water from the Montalban reservoir, which is the source of the water supply of Manila. During the rainy season, however, when the water from Montalban is muddy, artesian water is more generally used. The government ice plant sells an average of 1,063 demijohns daily, both of distilled and artesian water to government offices, hospitals run by the government, schools, and to the general public as well.

The soft drink industry in the Philippines is at present mostly in the hands of small manufacturers. Of the twenty-three aërated water factories in Manila, only a few are incorporated companies, the rest are partnerships or individually owned. Twelve of these factories are owned and managed by Filipinos, seven by Chinese, three by Americans, and one by Japanese. There are also small aërated water factories in many of the provinces.

The most important materials used in the local manufactures of soft drinks are bicarbonate of soda, sulphuric acid, refined sugar, and numerous extracts for different flavors, and corks or tin caps, and bottles. Many kinds of soft drinks are made, the most common among them being lemonade, sarsaparilla, and cream soda. The big factories make twenty or more different flavors.

The industry has a purely local market, although one of the big factories is said to have begun exporting some of its products to Java and Indo-China. With few exceptions, the output of each factory is consumed within the narrow confines of the districts were the factory is located. The local demand for aërated water products is not steady throughout the year, the most prosperous period for the industry naturally being the hottest months. In addition to the output of the local factories, the islands import from P.40,000 to P.60,000 worth of aërated water annually.

Cloth Manufacture

Among the oldest as well as the most common household industries is the weaving of cloths, which is now confined to a few regions. Originally intended only for supplying the immediate needs of the family, the cloths thus manufactured later assumed an important rôle in the domestic trade of the islands. The output of the simple looms increased as the industry found an ever-widening local market, P.680,246 worth of textile articles having been produced in 1918. The most important cloths manufactured are the "sinamay" and the "abatex," both of which are made mostly from the abaca fiber ; the "piña," made from the pineapple fiber ; "jusi," made from imported gummed spun silk fibers in threads mixed with mercerized cotton or the native abaca, piña, and maguey fibers ; and the "Abel Iloco" or Ilocano cloth, manufactured in the Ilocos provinces from both native and imported cotton threads.

The "sinamay" cloth is the most common material used for making dresses for Filipino women. It is also used to a certain extent for the "camisa de chino," and "barong filipino" by the male population. The leading producers of "sinamay" in the Philippines are the towns of Jaro, La Paz, Arevalo, Dumangas, Santa Barbara, Pototan, and Oton, all of which are in the province of Iloilo ; Calivo and a few other towns in Capiz province ; the different towns of the Bicol provinces, of which Legaspi is the centre of production and trade ; and Rizal and Bulacan.

The "*jusi*" cloth woven in the Philippines is made of different materials, the sources of which are both local and foreign. The "jusi" fibers or threads are imported from China. The jusi is a cheap kind of silk spun into fine threads and later gummed. The "jusi" cloth is made of this jusi fiber in combination with fine or mercerized cotton threads. Other fibers which go into the make-up of "jusi" cloth are the native abaca, piña, and maguey. In making the best and most expensive "jusi" cloth, spun silk is used instead of cotton threads and the fine native fibers. Among the leading producers of "jusi" cloth in the island are Malabon in Rizal province, and Hagonoy in Bulacan.

"*Abel Iloco*" or Ilocano cloth is the general term used for all kinds of cloths—blankets, towels, napkins, table covers, etc.—manufactured in Ilocos Norte, Ilocos Sur, La Union, Abra, and the Mountain province, where cotton is raised to some extent. Although probably most of the cotton thread used in weaving comes from China, the United States, the United Kingdom, and other foreign countries, a considerable amount of cotton is raised locally. Cloths made from the Philippine cotton thread is more durable, but owing to the crude local methods used in spinning the thread, it is much more expensive. The "Abel Iloco" is woven in many designs and is suitable for all kinds of cloths. The main quality of the Ilocano cloth as compared with the other native cloths of local manufacture is its superior strength and durability. The weaving of the "Abel Iloco" is carried on in many households in the Ilocano provinces. It is not produced in commercial quantities, except in the town of Paoay, Ilocos Norte, where towels and blankets are extensively produced ; in Bangar, La Union, where blankets and table covers are manufactured for trade ; and in the towns of Bantay and Caoayan, Ilocos Sur, where a great deal of light dress goods for women, and silk fabrics and handkerchiefs are turned out. In other towns, the production is barely sufficient to meet the family needs.

In the manufacture of all these cloths, simple wooden looms operated by hand are used. One woman is generally sufficient to operate one loom and the rate of production depends on the skill of the weaver and the intricacy of the design. There are only two factories for weaving cloth in the islands, both of which are located in Manila.

The Leather Industry

The preparation of raw hides and skins is an industry that has hitherto not received the attention it deserves. There are in Manila seven tanneries, owned and operated by Chinese. The town of Malabon, Rizal, boasts of the only modern tannery in the country. Small tanning factories are also in operation in Dagupan, Pangasinan ; Naga, Camarines Sur ; Taal, Batangas ; Cebu, Cebu ; and Meycauayan, Bulacan. The Philippine Tannery Company in Malabon turns out approximately 15,016 pieces a year. Twelve tanneries are in operation, having a combined output of from 2,500 to 5,000 pieces a month. The annual leather consumption of the shoe shops and factories is constantly on the increase. Salted hides which are used by the Meycauayan and Manila tanneries, come from the provinces. There are certain localities in the islands which graze big herds, but most of the supply of hides is obtained from localities where cattle and other animals are slaughtered for the market. Among the most important are those in Batangas, Mindoro, Jolo, Zamboanga, Masbate, Catanduanes, Misamis, Cebu, Palawan, Romblon, Pangasinan, Nueva Ecija, Tarlac, Pampanga, Ilocos Sur, Ilocos Norte, and Bulacan.

The only tanning materials used in the Philippines are the barks of the Philippine species of mangrove and of the camanchile tree. The former is very plentiful and cheap, selling at from P.3.50 to P. 4 per picul of 63.25 kilograms, in the Manila market. Good light-colored leather can be produced by combining the camanchile and mangrove barks, as shown by experiments performed by the bureau of science. The mangrove barks are not commonly used by local tanners outside of Manila, as they make leather harsh and of a dark red color. However, it is widely used in Europe and America. Camanchile bark is used almost exclusively by Philippine tanners, who prefer it on account of the light-colored leather that it produces. The price of air-dried camanchile bark has risen to as high as nine pesos per picul in the Manila market. The tree is widely scattered throughout the islands, especially in the Ilocos provinces, Batangas, Nueva Ecija, Rizal, Laguna, and Cavite.

Dye-stuff Materials

There are over one hundred species of dye-yielding plants in the Philippines, but so far only two have entered commerce to any appreciable extent, namely, indigo and sappan or sibucao. Indigo, locally known as *tayum*, *tagum*, *tayumtayum*, and *taguntagung*, has depreciated in commercial value as a result of competition by the coal-tar dye industry and the manufacture of arificial indigo. At present, it is cultivated on a small scale only in certain sections of northern Luzon, particularly in the Ilocos provinces, whence a little surplus of the local output is exported.

It is believed that the prospect of reviving the indigo industry in the Philippines is not altogether hopeless. Dyeing materials are greatly needed for coloring abaca, piña, cotton, and other articles, such as mats, hats, and baskets.

Sappan wood, commonly known as sappan or sibucao, is an uncultivated shrub found all over the Philippines, particularly on Guimaras island and in some parts of Panay. The dye it yields is brown ; but this may be converted into other hues depending on the ingredients with which it is mixed, as black, when employed with iron sulphate of iron rust ; red, with potassium bichromate ; and dark red, with lime. Other shades may be obtained by combining sappan with such materials as the bark of a Philippine tree known as "aro-o" with the root-stock of "kunig," in which cases the resultant dyes are reddish brown and golden or yellowish, respectively. It has been found by the bureau of science that the wood also contains brazilin, a certain coloring matter yielded by a Brazil wood which, however, is objectionable as a dye because it is not fast and is very sensitive to acids and alkalies.

Among the dye-stuff materials of minor importance, mention may be made of the barks of "bayog," "bancudo" "dungon-late," mangrove, the wood of "bancal" and the seed of "achuete."

Limestones, Bricks, etc.

According to the Bureau of Science "limestone of excellent quality is abundant throughout the Philippines, and guarantees to this archipelago important industries, among which is the manufacture of artificial stones and bricks from sand and lime." Among the many uses to which either the reconstructed stones or the sand-lime bricks can be applied, are the manufacture of building blocks, sills, caps, fence posts, slabs, tiles, wall-copings, templates, jambs, lintels, steps, landings, curbstones, pipes, sidewalk slabs, and ornamental work such as elaborate moldings, and artificial marble.

Common siliceous sand is said to be the most desirable and the cheapest source of silica for the sand-lime brick industry, being comparatively pure and fine for a cheap and durable product. Silica is often obtained from quarry débris, soft stone, and volcanic tuff. Siliceous sand, soft stones, and volcanic tuff occur abundantly in many parts of the country.

The Bureau of Science reports that " the most generally distributed calcareous material in the islands is a hard limestone of the Miocene age, which is usually associated with shales and sandstones, and occurs abundantly in nearly every island of the archipelago. It is uniformly pure. In general the physical condition of the Philippine limestones is very satisfactory. Their hardness, while sufficient to insure solidity during the burning process, is not great enough to prevent easy quarrying."

In the vicinity of Manila, " quarry débris is available. The amount of rock and crushed stone used in Manila break-waters, macadam roads, and concrete structures is considerable, and at present four quarry sites are operated to meet the demand, namely, the Rizal, the Manila city quarries on Talim island, Carabao island quarry in the south channel entrance of Manila bay, and the Sisiman quarry near Mariveles."

The three most commonly used materials for roofing in the Philippines are nipa, galvanized iron, and imported tiles. Nipa, the cheapest and most common of the three, is, due to its inflammability, bound to be proscribed in the bigger towns. Galvanized iron is an excellent but rather costly material, and so with imported roofing, tile. The need, therefore, of a more suitable material, cheap, easily obtainable, and if possible, of domestic manufacture, has for the last few years aroused popular interest.

Various tests and experiments along the line of devising a substitute that may be used for all time have been made. The bureau of science has combined clay and tuff, clay and sand, and glazed tiles with varied success, glazed tile proving to be the best, so far as imperviousness to water is concerned. The high price of imported glazing materials, however, is its serious disadvantage. From the tests made by the Bureau of Science, it has been demonstrated that suitable and economical roofing can be made almost exclusively from Philippine materials.

Match Factories

There is, so far, only one match factory in operation in the Philippines, this being located in San Felipe Neri, Rizal province. This factory was established some twelve years ago, and uses the available Philippine raw materials. After repeated trials and experiments the Philippine wood suitable for match sticks and boxes was found. The tropical climate in the islands, with its rapid atmospheric changes, created a problem for the manufacturers different from anything based on European and American experiments. It was especially so in connection with the formula used in the preparation of the composition of the match sticks and in the impregnation of the match sticks themselves in order to give the maximum of safety and reliability. The difficulty was satisfactorily solved, however, and the local output of matches by the factory improved from year to year. The native lumber now used by the factory is growing plentifully near Manila, around Laguna de Bay and on the island of Mindoro.

That the present output of the factory is insufficient to meet the local demand for matches is shown by the increasing amount of yearly importation into the islands of this commodity. The value of the annual imports of matches into the Philippines has grown from about P.900,000 in 1910 to P.872,289 in 1920, and P.761,119 in 1923. Most of the match imports come from Japan and China, the rest from the United States.

Button Manufacture

Button manufacturing is still capable of expansion. The vast supply of raw materials that could be obtained locally, together with the wide market for pearl buttons is a strong guaranty for the success of the button industry in the islands. Only two button factories have so far been established in the Philippines, both of them being situated in Manila. These two factories can use ouly a small fraction of the vast shell resources of the country. Because of its proximity to the supply of raw materials, its excellent shipping facilities, and the availability of water power which may be used advantageously for the industry, Zamboanga in Mindanao, is considered an ideal site for a button factory. The port of Zamboanga has direct steamship connections with foreign ports, as well as with Manila and other ports of the islands, so the handling of the product for trade would be easy.

The United States alone imports pearl buttons to the amount of nearly P.4,000,000 each year. Japan is now supplying almost half of this amount and the Philippines only an average of P.500,000 worth of the article.

Desiccated Coconut

The production and exportation of desiccated coconut offers one of the best opportunities for investment in the Philippines at the present time. The United States is the biggest market for this product, that country now importing an average of over five million pesos worth of desiccated coconut every year.

Ceylon is now getting most of this trade. That small island, with an area of only a little over one-fourth of that of the Philippines, exported in 1920 not less than 58,191,326 pounds. In 1923 there were only three desiccated coconut factories in operation in the Philippines and our exports of this product to the United States amounted to only 4,349,152 kilos (9,568,134 pounds). The Philippines abounds in nuts just as good as those grown elsewhere and there is no reason why this industry cannot be developed here as in Ceylon. Under the new Tariff Act of the United States, desiccated coconut imported from foreign countries pays a duty of 3½ cents gold per pound, whereas, desiccated coconut from the Phillipines enters the United States free of duty.

Pineapple Canneries

Although local conditions favor the development of the pineapple industry on a big scale, only one pineapple cannery has so far been established in this country. The demand for canned pineapples in the world is ever growing. The canned fruit is in big demand in the local markets and in the United States, in China, Japan and Europe. The United States alone now consumes over forty million pesos worth of pineapples every year.

The biggest source of supply of this product at the present time is Hawaii. Experience has shown that pineapples grown in the Philippines from Hawaiian seeds produce good-sized fruits with comparatively sweeter flavor than those raised in Hawaii. Thus the Philippine pineapple will require less sugar when canned. It also has less acid content than the Hawaiian product. Hawaii now seems to have reached the point where it can expand its pineapple industry only at the expense of the sugar industry there. Land in Hawaii, being in great demand particularly for sugar cultivation, now commands a high price. In the Philippines, on the other hand, there are extensive uncultivated lands available for pineapple growing and which may be leased or purchased on comparatively easy terms. The trained labor needed for the canneries can also be supplied locally.

Glass Manufacture

Glass manufacturing could be profitably established in the islands, on account of the enormous demand for glasses and glass containers. The experiments of the Bureau of Science have definitely shown that good grade of bottle glass can be manufactured from Philippine materials. Over half a million pesos worth of glass bottles, dishes, and similar glass manufactures are being imported into the islands every year, mostly from Japan. The local market for these articles is still growing steadily.

Paper Manufacture

The abundance of the local supply of raw materials for paper manufacture has been ascertained, while suitable sites for paper pulp mills have been found. The most important local raw materials for the manufacture of paper in the Philippines is *cana bojo*. This bamboo species is found in large stands in many parts of the islands, mainly in the province of Bataan, near Manila bay. " Cogon " and " talahib " grow in almost all the uncultivated regions of the archipelago and the waste of abaca and maguey affords an adequate supply. Other minor sources of pulp material are coconut coir, nipa palm stalks, parts of the betel nut and buri palm, and the split of the bejuco. Paper pulp could also be made from the chips from lauan, cupang, and other soft Philippine woods.

Three localities are known to be especially adapted for paper mills—Orani in Bataan, Manila, and Masbate. Orani is considered to be the best site on account of its adequate supply of labor and fuel, and its proximity to shipping centres. Manila has the disadvantage of distance from the source of raw materials and of the comparatively high cost of labor prevailing in the city. Masbate, on the other hand, has large deposits of limestone and fuel.

Act No. 2742, which came into effect in February 1918, authorized the Secretary of Commerce and Communications to guarantee profit of not to exceed four per cent. per annum for six years upon any capital actually invested by a person or corporation in a paper and pulp factory within a year from the passage of the act. The local capitalists failed to take advantage of this offer.

The Perfume Industry

The Philippines is especially rich in plants which produce terpenes. An exhaustive investigation of the Benguet pine by the Bureau of Science has shown that excellent turpentine and colophony, practically identical to the products in America, can be produced from this source. Many fragrant plants and flowers possess essential extracts and oils. Among these are ilang-ilang, champaca, orange, lemongrass, vetiver, cinnamon, and ginger. Several of these may be used in the manufacture of non-alcoholic beverages and fruit flavors. "Ilang-ilang" oil, which is not edible, is among those produced in the Philippines. This oil comes from the flowers of the ilang-ilang tree which grows abundantly though uncared for in many parts of the country. In 1923 the Philippines exported 1,940 kilos of ilang-ilang oil, valued at P.118,888.

Vegetable Oils

Aside from coconut oil, other important vegetable oils are produced in the Philippines from the oil-bearing seeds of lumbang, castor, casoy, and kapok. Lumbang or candlenut oil is used principally in the caulking of vessels, in the manufacture of soap, as a substitute for linseed oil in the manufacture of paints, for plaster, for adulterating coconut and olive oils, and for waterproofing lanterns, umbrellas, aeroplanes, and balloons; and the cake left after extraction, for fertilizer. It ranks second to coconut oil, the annual demand ranging from 5,000 to 10,000 gallons.

Castor oil, from beans known locally as tañgan-tañgan, is used in medicine, in the arts, and, in some places, for cooking purposes, but its principal use is in printing and dyeing. It is also utilized as an illuminant. As much as 100,000 tons of castor oil are needed by the United States every year. The plant is not cultivated here to any appreciable extent.

Other oils in the Philippines are casoy oil, which may be used as a substitute for olive oil, and kapok oil, which has an agreeable taste when properly extracted.

Caustic Soda

The key to the successful establishment of many new industries in the Philippines is found in the local manufacture of caustic soda. A considerable amount of caustic soda is needed in the manufacture of various articles of trade, such as paper and paper pulp, glass and soap. It may be found advisable first to increase the domestic supply of caustic soda before undertaking many other new industries.

Electrical Starter for Semi-Diesel Crude-oil Motors

AS is well known, the starting of semi-Diesel engines is combined with certain difficulties, which comprises the use of blowlamps. Many inventors have from time to time aimed at overcoming these difficulties and many experiments have been made with varying results with electrical ignition. However, these experiments have for the most part failed utterly to bring about the results aimed at. The chief reason being the difficulty to find an ignitor, which would resist the developed high temperature.

A Swedish inventor, however, Mr. C. A. Rudquist, C.E., has recently succeeded in solving this problem in a manner, which is entirely satisfactory. This invention for electrical starting of a semi-Disel engine is as easily applied and with equally successful results as can be obtained on a gasoline-motor. The arrangement consists of a coil placed in the cylinder of the motor, of a material of ever lasting durability, and this coil is connected with a storage battery fed by a small generator coupled direct to the motorshaft. The time required for starting of a motor is by this new process reduced down to 15-25 seconds only.

A company was formed in 1922 for the purpose of exploiting the invention and their efforts have proved a great success. Many thousands of these aggregates are already delivered and installed on new, as well as old, motors and agreements have been entered into with representatives in most parts of the world, whilst certificates from well-known authorities prove the efficiency and durability of the new arrangement.

The storage battery connected with the arrangement may also be used for lighting purposes and the cost of installation is therefore well compensated for by this fact alone.

Mr. Rudquist has also invented an electrical manœuvre-arrangement, which can be placed in the navigation-room and by means of which a semi-Diesel engine can be started, reversed, the speed altered, etc., from this point. The more or less complicated arrangements which are now in use for reversing a propeller are, through this new system, quite unnecessary.

The Trade Outlook in China

WRITING before the outbreak of the recent civil war, the British Commercial Counsellor at Shanghai, in his report to the Department of Overseas Trade to June, 1924, says that the investment of capital in China's industries in the more remote centres is attended with serious risks. Such developments as have taken place have mainly been confined to the neighborhood of the larger treaty ports. Progress is greatly hampered by insecurity and maladministration.

Apart from those difficulties there are other factors which help to explain the fact that while the total volume of imports and exports shows small sign of falling off, and even tends to expand, the merchant houses are finding it more difficult to carry on business at a profit, or even to cover expenses. First and foremost must be placed the excessive competition for the limited trade offering either in imports or exports, and this remark applies not only to the foreign merchant firm, but also to the Chinese dealer.

For the manufacturer who is not prepared to establish his own sales organization, the British firms in Shanghai, Tientsin and other ports offer the most satisfactory method of marketing British goods, and if the manufacturer is prepared to provide his agent with technical assistance, samples and advertising materials his prospects of securing adequate returns will be largely increased.

Although the exports from Great Britain to China in 1923 show some falling off from the previous year's, there are good grounds for saying that British goods are still holding their own in the face of ever-increasing competition.

Conditions as regards machinery and engineering have been extremely unfavorable, and merchants have had to devote attention mainly to the settlement of old contracts and to attempting to collect long overdue accounts rather than to booking new orders. Very few new contracts of importance have been placed, and apart from deliveries of machinery ordered in previous years business has been confined, as a rule, to supplies of various kinds and extensions of existing plants.

Within the next few years heavy replacements will be essential on all the railways, but unless the rapacity of the military can be checked and a reasonable proportion of the revenues be devoted to maintaining the efficiency of the lines, it is difficult to see how the purchases can be financed. Every foreign firm who has had dealings with the railways has heavy claims outstanding against the government.

The electric light companies at Canton, Mukden, Soochow and other cities have installed large extensions of plant. A very large proportion of this business has gone to Germany, the prices quoted by German firms being frequently from 30 per cent. to 50 per cent. below English and American prices.

Electrical Goods in Java

By Can. Government Trade Commissioner A. G. Muddiman

DEVELOPMENT of its water-power resources is a question of paramount importance in the Dutch East Indies. It is estimated that five and a half million horse-power are available for this purpose in the archipelago. West Java is better developed than other areas; in this district energy from the big power stations at Bandoeng and Buitenzorg is supplied by the government at cost price to municipalities and private companies. The generating machinery in these stations is of the most up-to-date type, and the engineers are said to be of the highest class. The cost of electrical energy in the Preanger district of Java is about 4.25 guilders per kilowatt month. In electrical lines, as with other products in the area, intense competition is to be encountered, and, as a rule, the cheapest producer wins out.

LEGISLATION OF ELECTRICITY.

According to a semi-official statement, "since August, 1917, the new service of water-power and electricity has been detailed to utilize in a practical way the hydraulic energy, now for the greater part still lying dormant in different parts of this island empire, as well in the interest of the state as in that of private industry. . . The natural conditions which everywhere contribute to create important water-power supplies may be said to be very favorable in these countries."

In drawing up its regulations, the department of water-power and electricity in its policy of guidance has laid down that no electric-power can be erected without a concession. The right to grant concessions may ultimately be transferred to local authorities subject to rules drawn up by the government. By these means it is hoped that the necessary uniformity in the supply of electricity will be permanently guaranteed. It has also been laid down that wherever desirable in the interests of adequate exploitation of natural sources of power (such as water, lignite coal-fields, etc.), the generation of electricity should remain in the hands of the government without necessarily implying the establishment of a monopoly of generation of electricity. For electrical distribution and sale, power companies on a community basis are hoped for. Their tariff policy should be such as to popularize the use of electricity as much as possible.

ELECTRIC POWER AND WATER POWER RESOURCES.

Sixteen cities have electric light and power, supplied by private companies, including Bandoeng, Sourabaya, Semarang, Batavia and Medan. The government owns several power stations in connection with state industries. Moreover, there are a great number of plantations and factories having their own electric supply.

The surveys necessary to an accurate report of the water-power resources of these colonies having not yet been completed, the following estimate of the minimum water-power which can be developed in Netherlands East India must necessarily be considered approximate: Java, 500,000 h.p.; Sumatra, 2,000,000 h.p.; Borneo, 2,000,000 h.p.; Celebes, 1,000,000 h.p.—a total of 5,500,000 h.p.

Only 25,000 h.p. have been developed, and another 25,000 h.p. are being developed for general distribution of electric energy for light and power in the cities, for agricultural enterprises and manufacturing industries, for railroad electrifications, for wireless telegraph stations and other government institutions.

Cheap water-power is available for electrochemical industries, In round numbers at least 500,000 h.p. on the islands of Sumatra. Borneo and Celebes have been located for use in connection with electrochemical industries for the manufacturing of nitrogen fertilizers. Calcium carbides, it is stated, can be made here; the raw materials are available in good quality and quantity.

SWITCH BOARDS AND GEAR.

American equipment is found in use such as the General Electric and Westinghouse Companies use. Cell oil switches are used at some stations. For high-tension schemes ironclad control panel units are in use.

TRANSMISSION AND DISTRIBUTION.

Generally speaking, on the island of Java about 60 miles of transmission line for 25,000 volts and about the same length for voltages of from 3,000 to 5,000 volts are in use. On the island of Banka a 30,000 volt transmission line of 60 miles in length is partly in use, partly under construction. On the island of Sumatra some 10 miles of 6,000 volt transmission line are in use; a line for 25,000 volts 15 miles in length is under construction. Transmission lines for higher voltages up to 100,000 volts are planned.

Alternating current is generally used. Direct current is only in use in small plants in sugar mills. In regard to overhead wire, high-tension wires (following the European principle) are always bare; low-tension wires are only insulated for crossing telephone lines, etc. Underground laying even in cities is very uncommon. The government is making an effort to standardize distribution of electric energy in all municipalities. Such standardization in regard to voltages will save stocks of unnecessary spares being maintained by importers. The voltage for light is 220/127 and for power 380-220 on the four-wire principle. The voltage for high-tension feeders is 30,000 A.C. and will in future be 70,000 A.C. All cables are armored between transformers.

DEMAND FOR BARE COPPER WIRE.

There is a good demand for bare copper wire, but for the present prices have been drastically cut.

INSULATORS.

To obtain a suitable high-tension insulator for a tropical climate is no easy matter. Pin insulators and metal cups over suspension have been employed, and the latter are not entirely satisfactory. The writer found that at present high-tension insulators made in the United States were obtaining favor. In view of this he sees no reason why Canada should not obtain a share of the business, if prices are competitive, and if Canadian insulators can stands up under the climate. Double and triple sheds are used. The rapid changes in temperature quickly crack porcelain insulators if at all faulty or not properly baked.

SWITCHES, ETC.

Switchboards must have all conductors at least 5 cm. from the wall and be backed with fire protection, such as asbestos. No automatic switches shoul be used with ground wires. Single and double switches should have a contract surface carrying capacity of at least 6 amperes. Switches in wooden cases may be used having a maximum current carrying capacity of 35 amperes and a working pressure of 220 volts. Motors, it is said, with a consumption of over one kilowatt must be provided with automatic releases in their respective starting equipments. Metal-covered uninsulated switches are prohibited.

CARBONS.

There is a fair demand, it would seem, for special carbons for the projectors of moving pictures; these might be marketed through local film houses to the two hundred odd moving picture houses in Java.

ELECTRICAL MACHINERY.

The greater number of electrical machines are supplied direct by Holland, while Germany, the United States, and Japan have delivered considerable quantities. Of generating plant. Holland supplies about 50 per cent. of the total imports, while the United States, Great Britain, and Germany are also well represented.

CONDUITS.

Metal conduits must be galvanized and smooth finished. Through walls and floors seamless conduits painted with white lead are to be used. Seamed conduits are not to be bent, or if so the seam must be underneath. Bent conduits must have a radius of at least 8 c.m. at each bend. A common size of seamed conduit in use would appear to be ⅜-inch and seamless ¾-inch in diameter.

OPPORTUNITIES FOR GENERAL ARTICLES.

There is not a large demand for bells and buzzers. There is a fair demand among the Chinese and Japanese for cheap Japanese-made electric torches, with which Canada cannot compete. There is only a limited demand for electric irons, but Canada ought to be able to supply them. Lamps are generally of Dutch origin, and it would be extremely difficult to sell against these with any financial success. Cartridge fuses are said not to be popular because of their cost. There is no real call at present for cooking and heating appliances, as far as the writer could ascertain. Storage batteries in this climate have a difficult time and must be imported inert. There are surprisingly few electric fans in use in the Netherlands East Indies as compared with the Straits Settlement. The Dutch seem to dislike them and some of the best hotels are without them. An American ceiling fan at time of writing is being brought into Singapore, in the Straits Settlements, for $24 c.i.f., to compete against a well-known Italian make, but the American is said to lack finish, design and durability.

SAMPLES.

Samples of all installation materials such as wires, conduits, insulators, etc., should be deposited at Bandoeng in order that they may be approved by the authorities. The type of installation proposed should be shown where necessary.

ELECTRIC LAMPS.

While far short of 100,000 dozen oil lamps, hanging and wall, were imported in 1923, the demand for electric lamps in the cities is growing. It is true in 1923 importations fell to a value of 182,738 guilders from the previous year's 436,288 guilders. But under normal conditions this demand can be expected to increase. The supply is controlled from Holland, and it is very doubtful whether Canada can compete.

METAL TELEGRAPH POLES.

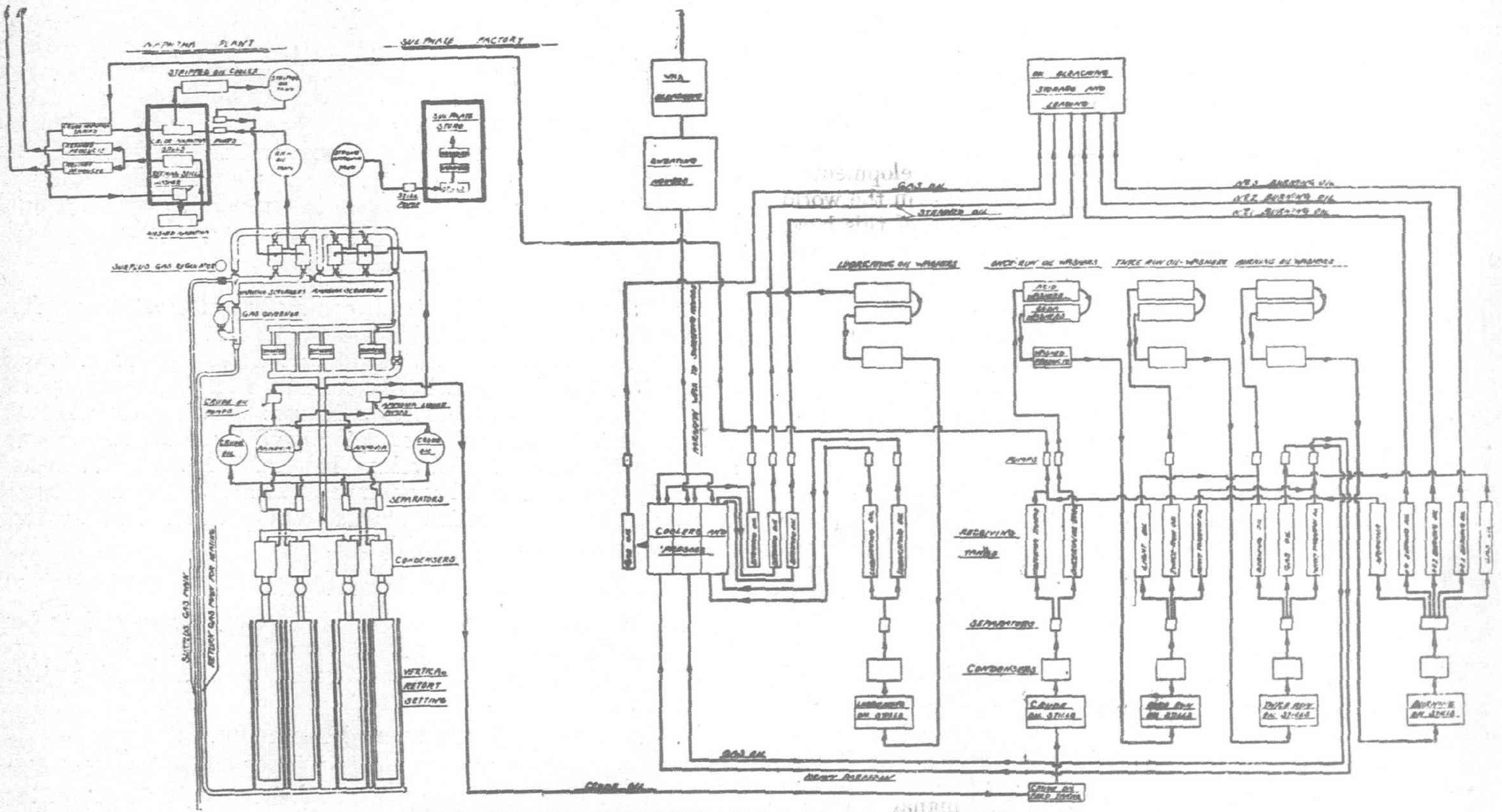
From time to time there is a demand for metal telegraph poles and electric light standards. As municipalities take up these improvements, the demand should expand. The type required is similar to those seen in Holland and Germany. The latter country would seem to have done the bulk of the supplying.

ELECTRIFICATION IN SUGAR PLANTS.

Perhaps future employers of hydro-electrical power in Java will be found in the sugar industry. At the present time this phase of the market has not been developed. A demand might be created through the installation of small electrically-driven lighting plants as auxiliary units for sugar factories during the dull season.

Description of a Shale Oil Distillation Plant

(*Continued from page 114*).



PROPOSED SHALE DISTILLATION PLANT—FLOW DIAGRAM

with acid and soda and again distilled in a set of six boiler stills giving burning oil, gas oil and heavy paraffin oil. The burning oil fraction is mixed with the light oil from the previous distillation then washed as before and re-distilled in boiler stills, giving naptha, the various grades of burning oil, and gas oil.

The naptha is sent to the naptha plant and the burning oil to the bleaching and loading house.

There now remains to be dealt with the gas oil from the last two distillations and the heavy oil and paraffin from the second distillation and these are dealt with in the paraffin wax plant. The gas oil being cooled and pressed to recover the paraffin scale and heavy oil similarly treated giving blue oil and paraffin scale and heavy oil similarly treated giving blue oil and paraffin scale.

The blue oil is returned to the distillery for a further washing and distillation and the fractions are cooled and pressed giving lubricating oil and paraffin wax.

The whole of the paraffin wax recovered in these processes is treated in the wax house, the oiils being cooled and the crude wax crystalized out in revolving druns cooled by liquefied ammonia.

The paraffin scale is then hydraulically pressed and melted up for delivery to the sweating houses where it is solidified in banks of trays and the occluded oily impurities sweated out by raising the temperature of the chambers by means of steam radiators.

The sweated paraffin is then sent to the refining house where it is agitated in charcoal washers, filter pressed, paper filtered and solidified into cakes for shipment.

Power House

The power house is situated adjacent to the paraffin plant. Here are situated the generating sets and ammonia and air compressors for the refinery. Alongside the power house will be built a battery of steam boilers and superheaters for the supply of steam for the whole of the plant.

No provision is made on the lay-out for a water tower and cooler with the necessary circulating pumps.

Acid Supply

Steel receiving tanks are provided near the railway line at a low level suitable for receiving acid and soda from rail tank wagons. A compressed air line will be led to these tanks to deliver to the high level acid tanks on the various parts of the works.

British Contracts for the Far East

(By a London Correspondent)

THE uncertain aspect of affairs in China, and the somewhat troubled conditions in Japan, have been factors which have tended to keep new contracts for the Far East at a low ebb, added to which the tail end of the year is always a quiet time for placing new orders. It may, however, be said that there is a distinctly more hopeful feeling in the market generally, and prices of steel are hardening a condition of affairs which would seem to sense better times in store. Quite a number of contracts are known to be in the market awaiting placement and it is anticipated that with the turn of the year quite a number of new developments may be looked forward to with confidence.

By far the most important announcement made has been the decision of the new government to go on with the Singapore naval base. It will be remembered that the late labor government scrapped the idea, much to the disgust of the country at large, and to the twits and jeers of the Australian and New Zealand governments, to whom the scheme had been virtually promised and to whom it meant everything in the form of protection. Cable reports are to hand that the Japanese official attitude towards Singapore is expressed in the Japanese word *shikataganai* meaning: "It cannot be helped." The national attitude is distrustful and partly hostile, in spite of the official explanation that the Washington Agreement is not contravened. Referring to the scheme, the Japanese papers report Viscount Kato as having said at a dinner:—

"Personally, I am none too pleased with Great Britain's intention to construct the Singapore base. But as the Washington Agreement is not contravened we are powerless to prevent it. So Japan has no alternative but to hold her peace and await developments."

As far as can be seen from here there is no reason in the world why any country should object to the establishment of this base, any more than they should object to Great Britain's fleet traversing the oceans of the world. It is protective, not threatening, and with the peaceful and friendly associations now existing between Great Britain and all others it purely resolves itself into the question of location for housing, and the selection of Singapore was made as being the most suitable to find. It is well on the cards that in the distant future the very persons who at present are inclined to view the British motives with suspicion may be the first to feel the benefit of the scheme. However, leaving aside all political questions the contract is an important one and will materially assist in developing many interests in the Far East.

In the shipbuilding world quite a number of new launchings in which the Orient will be interested have recently taken place. It is true that some of the vessels are not constructed for any but tramp service, yet they have all been built with the idea of at some time or another, if not regularly, trading in the waters of the Far East. Some of the details may therefore be of interest.

The Canadian Pacific are having two new steamers built by John Brown & Co., at Clydebank, the *Princess Kathleen*, and the *Princess Marguerite*. The former is just completed and is undergoing her trail trips and is to be almost at once taken to the Pacific coast via Panama, by Captain Troup, manager of the British Columbia steamship service of the C.P.R. The second vessel, the *Princess Marguerite*, was launched on November 29, and will shortly follow the first named vessel. Primarily these two boats are intended for the Victoria, Seattle and Alaska run, but may at any time be transferred either as regular or additional carriers for the Oriental services of the line.

Another vessel the *Thistleros*, a motorship, was launched on December 9, by David and William Henderson & Co., Ltd., of Glasgow, built to the order of Allan Block & Co., Ltd., of Sunderland. It is the firm's first motorship and is of the following dimensions. Length between perpendiculars 400 ft. Breadth extreme 53-ft. 8-in. depth moulded 35-ft., with a gross tonnage of 4,700, has a complete shelter deck, and is built to class 100 A1 in Lloyd's Register. Electric auxiliaries are fitted throughout, including winches, windlass and steering gear. Comfortable accommodation is provided amidships for officers and engineers, and the crew are berthed in commodious quaters aft.

The propelling machinery, built and installed by Harland and Wolff, Ltd., is of their Burmeister Wain type, and consists of one single-acting Diesel engine developing a normal power of 1,850 b.h.p. when running at 90 revolutions per minute.

On Saturday, December 13, the steamer *Skegness*, built to the order of Sir William Smith & Sons, Ltd., Cardiff, by Workman, Clark & Co., Ltd., Belfast, successfully underwent a series of trails in Belfast Lough. The vessel is of the shelter-deck type, with topgallant forecastle, and has a length of 415-ft. and beam of 54-ft., with a gross tonnage of 4,570, and is constructed to the requirements of the British corporation for their highest class B.S.* "with freeboard." Special arrangements have been made for the carriage of grain and general cargoes. There are five large holds equipped with very complete loading and discharging apparatus. Water ballast or oil fuel can be carried in the double bottom, and in atdition for special voyages, a cargo hold has been constructed to serve as a deep tank for ballast or oil fuel. The accommodation for officers and crew is on a very good scale and fulfils the latest requirements of the board of trade.

The machinery, which was also constructed by Workman, Clark & Co., Ltd., consists of one set of vertical inverted, direct-acting, surface condensing, triple-expansion engines, taking steam from three large multi-tubular boilers arranged for burning of coal or oil, fuel.

The Hamburg-America line has recently placed an important contract with the Bolohm and Voss yard for a motor ship of about 9,000 tons, which is intended for the company's East Asiatic services. A similar vessel has been ordered frm the same yard by the German Australian Steamship Company. They are the first German orders for new tonnage that have been heard of for a long while. Meanwhile, the *Fulda*, 9,400 tons, the new motor ship built for the Norddeutscher Lloyd by the Aktien. Gesellschaft Weser and loaded at Hamburg has just commenced her maiden voyage.

NOTABLE TRIPS

The two Dutch tugs *Willem Barendsz* and *Vlaaderen*, of the bureau Wsymuller, Rotterdam, after having safely delivered the 5,000-ton floating drydock, built by the Netherland Shipbuilding Co., Amsterdam, for the Sabang Bay, Harbor & Coal Co., at the Puluh Weh harbor received orders to proceed to Sourabaya to tow four small craft, including a small cutter suction dredger to Melbourne, the tugs and their tows having sailed from the East Java port towards the end of November. The trip which will occupy about two months will be an exceptionally difficult one to the crews on account of the fact that no experienced runners being available to man the tows, men have to be spared from the tugs' crews for this purpose. On account of the small size of the craft towed it is practically impossible to make hot meals on board, and during the greater part of the trip these men will have to live on the most simple food procurable which, together with the hard work required of them, makes the trip one of great physical endurance. After arrival at the Australian port both tugs will proceed to Adelaide to take the Ellerman liner *City of Singapore*, seriously damaged by fire and explosion, to Rotterdam, for repairs. The series of trips in which these two tugs are now engaged undoubtedly for the longest and most difficult ocean voyages ever made for this type of craft, and if fortunate enough to see the end, probably no seaman will ever have been more heartily glad of return to the home port than will be the men of these small though powerful craft.

NEW E. 3,000 H.P. ENGINE

Much interest attaches to the tests of a new North-Eastern Werkspoor engine for the motorship *Raby Castle* now building at the Caledon Yard, for the Lancashire Shipping Co., Ltd., of Liverpool. The tests were made at the works of the North-Eastern Marine Engineering Co., late in December, the power developed being absorbed and measured by a huge water brake.

The engines may be described as an 8-cylinder set of 4-stroke single-acting Diesels 730 m.m. diameter, by 1,300 m.m. stroke, developing 3,000 h.p. at 92 revolutions per minute.

The first impression that one gets is that the engine is far too big for the job; but that is true of all direct-drive marine oil-engines. Then one realizes that there are no boilers, and that what one is looking at is the sum total of the propelling mechanism But the advantage to be gained by the adoption of the double-acting principle, especially when allied with the two-stroke cycle, is self-evident. Much less weight, much less space and an engine room far more in accord with the regulation ideas of proportion. The crank-shaft, it may be stated, although "built" is practically "solid"; that is to say, it is constructed on the now well-known "Unity" system in which the ends of the pins and journals are fused solid into the crank webs and cannot shift; in fact, according to tests carried out the shaft will twist first. It is perhaps no exaggeration to say that the engine bristles with fool-proof devices. Certainly everything that the wit of man can devise to annul mistakes and facilitate handling is incorporated inro the design and the operations of starting, stopping, and manœuvring are of the simplest. On the question of accessibility and ease of overhaul it is of interest to observe that the pistons can be withdrawn without disturbing any of the top gear or lifting the cylinder covers, which are integral with the liners. The vessel will be towed from Dundee to the Tyne to receive her machinery at the North-Eastern Marine's jetty, and every care has been taken to ensure that the keelsons are sufficiently strong and stiff. This is, of course, a matter of the greatest importance in a long Diesel engine where rigidity and permanence of true alignment are extra essential.

Railway Carriages for Hongkong

It has just been announced that the Leeds Forge Co., Ltd., has received an order from the Hongkong railway for six steel carriages and has also booked a contract from the Great Indian Peninsular railway for two special steel wagons.

Contracts for Electric Light Bulbs

The British Electric Light bulb manufacturers announce very large contracts for these goods, included in which are: The Bombay Baroda, and Central India railway for 17,500 gas filled lamps. The East Indian railway 8,000 Osram lamps, while the Sydney municiapl council has placed a huge order for 100,000.

Underfeed Stokers for India

The Underfeed Stoker Company, London, have secured orders for four underfeed stokers for the United Alkali Company and also contracts for air heaters for the Lansdowne Jute Mills at Belgachia, India.

New B.I.S.N. Liner

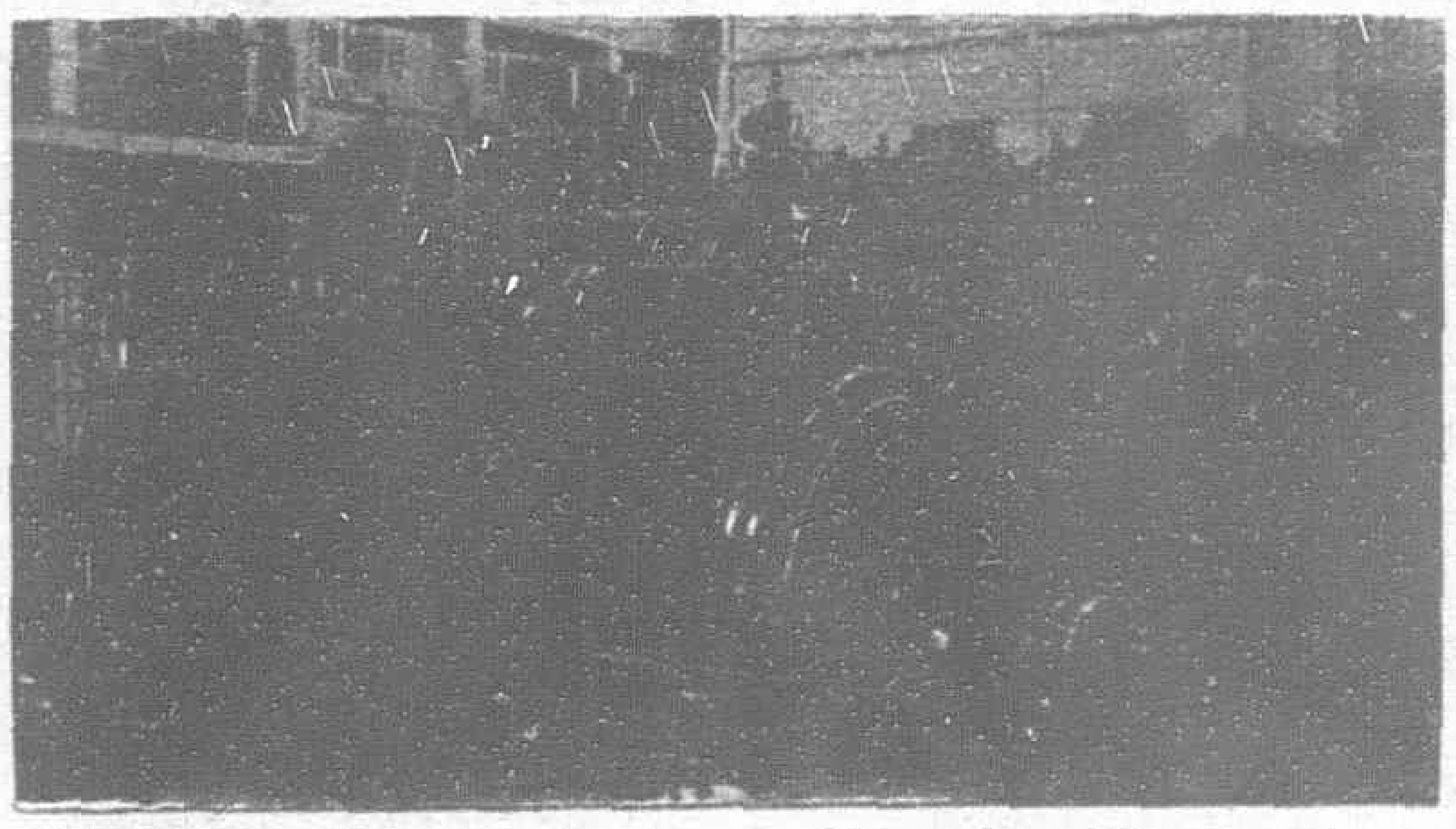
Announcement is jusr made of a contract for a new British India Steam Navigation liner being placed with Hawthorn, Leslie & Co., Hebburn. The vessel is to be a large cargo and passenger steamer. The same firm has recently constructed three fine vessels for the same owners. In connection with this company's activities, an interesting launch, that of the *Santhia*, from the yards of Swan, Hunter and Wigham Richardson will recall memories in the East. Her predecessor in the title was a 5,000-ton cargo steamer, with accommodation for a few passengers, and was launched by Dennys, of Dumbarton, in 1901, a unit of a huge class of similar ships launched at various yards between 1895 and 1901. She was designed for the Indian and eastern trade, and it was there she spent the greater part of her career, with occasional runs down to Australia. During the war she was left to her owners when so many of her consorts were commissioned by the authorities, but that was not the only occasion when she showed very satisfactory financial results, for she was a steady dividend earner with a remarkable freedom from accident all through her career. In 1923 she was sold to Japanese owners, who kept her registered at Dairen, from which port she has been running to various Eastern ports ever since, latterly across the Pacific with supplies for the relief of the earthquake sufferers. There is every probability that the old and new *Santhia*, although rechristened, may travel in the same routes, in which case it would be exceedingly interesting to watch their respective results.

Fengtien Industrial Company

The Mukden Industrial Commissioner has been ordered by Marshal Chang Tso-lin to organize the Fengtien Industrial Company in Mukden. The company is to have six departments: paper mill, woollen factory, printing office, wood works, oil painting works and iron works. It is to be capitalised at $3,000,000, two-thirds of which are to be government shares and the remaiuiug one-third offerd to public subscribers. It will employ 500 workmen at the start and will have a management similar to that of the Fengtien Cotton Mill.

SULZER
BROTHERS

SHANGHAI ENGINEERING OFFICE
No. 4 AVE. EDWARD VII
Power Station, French Concession, Shanghai
2 by 1,500 bhp. 2-cycle Sulzer Diesel Engines
1 by 3,600 bhp. ,, ,, ,, Engine



本公司常備目錄供給各界垂詢工程事務亦竭誠酬答

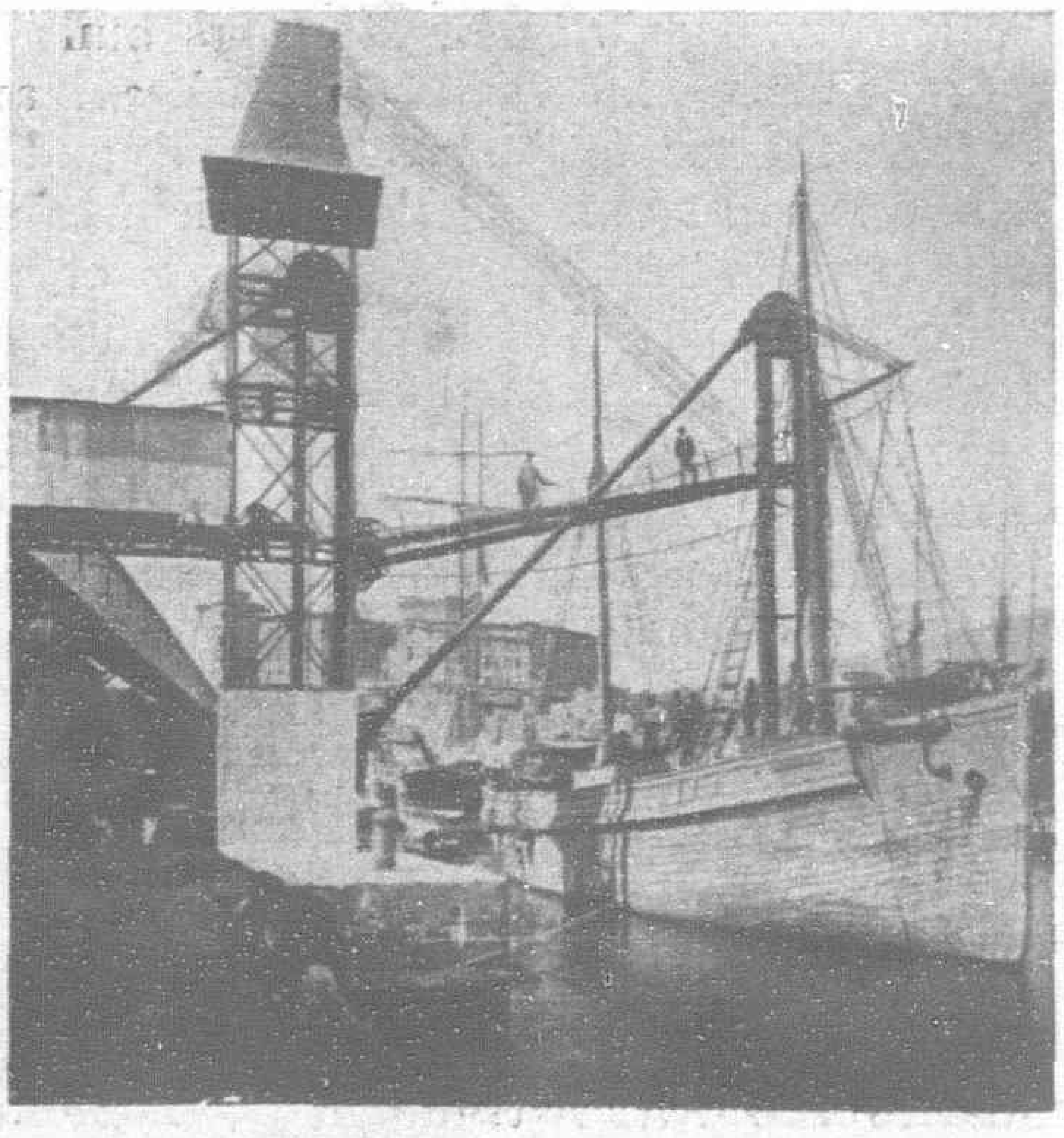
蘇爾壽工程事務所
上海愛多亞路四號

Uniflow Steam Engines, Upright Water-tube Boilers, High and Lowlift Centrifugal Pumps, Fans and Ventilators for all purposes, Fire Engines, STATIONARY AND MARINE DIESEL ENGINES, Airless Injection Diesel Engines, Ice and Refrigerating Plants, Maag Gears and Maag Gear Planing Machines.

WINTERTHUR. SWITZERLAND.

BUHLER BROTHERS
Engineering Works and Foundries
UZWIL (SWITZERLAND)

Established 1860 Employees abt. 2,000



Moulin Feola & Jeandeau Drydock, Crane in Action

SPECIALITIES:
- Portland Cement Works
- Brick and Tile Making Plants
- Chocolate and Cocoa-Factories
- Breweries and Malteries
- Powder and Celluloid-Presses
- Crushing and Breaking Machinery
- Silico-Calcareous Brick Works
- Paste-Goods Factories
- Briquetting Plants
- Rice-Mills
- Roller Mills for Soap and Paint Manufacture
- "Duplex" Newspaper Printing Presses
- Conveying Plants of every kind

For particulars apply to the
Far Eastern Office: BUHLER BROTHERS
P. O. Box 227 HARBIN (Manchuria), Kitaiskaya Street 59